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Surgical Methods and Results

*In Cases of Tubercular Disease, Aneurism, Ununited
Fractures, Head Injuries, Neoplasms, Vesical
Calculi, and Diseases of the Bones
and Joints.*

BY

J. WILLIAM WHITE, M.D.,

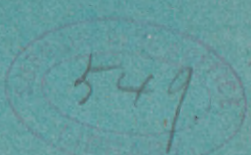
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SURGICAL METHODS AND RESULTS

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THE following cases have occurred in the recent service of Dr. J. William White, in the Hospital of the University of Pennsylvania, and have been selected chiefly from that of the eighteen months ending June, 1892. A few cases dating further back have been included, and two or three quite recent cases of special interest have been added. The list includes a large number of private patients operated upon at the hospital, as well as the ordinary ward cases.

It is worthy of note that in some thousands of etherizations not once were symptoms noted which occasioned serious alarm, while in not over two dozen chloroformizations one child narrowly escaped death from the anæsthetic.

The details of modern antiseptic practice have invariably been rigidly adhered to. The usual preparation of the field of operation is carefully carried out. The part is first shaved, then thoroughly scrubbed with soap and hot water, then washed with alcohol, and finally with bichloride solution 1 : 1000. If the patient is admitted to the hospital in time, and this is always desirable, this cleansing is carried out the day before operation, after which the part is kept wrapped in towels wrung out of sublimate solution 1 : 3000. The bowels are well cleared out by a laxative given in the evening, aided if necessary by an enema given the following morning. After a light breakfast no further nourishment is administered till after the operation. After anæsthetization, and immediately before the first incision, the part is again thoroughly cleansed with alcohol and sublimate solution 1 : 1000.

All instruments are boiled for twenty minutes in water containing one per cent. of sodium bicarbonate. This makes the boiling-point of



water slightly above 212° F., and prevents the rusting of the instruments. From this solution instruments are transferred to trays containing hot boiled water. Sponges are wrung out of 1 : 4000 bichloride solution. Vessels are tied with sterilized silk or catgut. Silkworm-gut is preferred for suturing. Clean, incised wounds in healthy tissues are closed. Where drainage is necessary, strands of sterilized silk or a fenestrated rubber tube is used. Lister's latest dressing, the double cyanide of zinc and mercury, and the bichloride dressing wrung out of a 1 : 3000 solution have been employed. Both present points of advantage, and either makes a satisfactory dressing.

The cases have been grouped from a clinical standpoint, and histories which would represent simply repetitions with minor points of difference have been omitted.

The clinical diagnosis of all neoplasms has been confirmed by microscopical examinations.

TUBERCULAR ADENITIS.

During the period embraced in this report, seventy-six operations have been performed for this affection. The tumors were found in the following regions: cervical region, 55; axilla, 7; inguinal region, 5; miscellaneous, 9. The majority of the patients were children or young adults. All recovered. The histories are so similar that a brief outline will suffice for the group. Usually there had been lesions of the area drained by the lymphatics communicating with the inflamed gland, thus opening the way to tubercular infection or rendering active a latent tuberculosis. When the cervical glands were involved, inflammations or catarrh of the tonsils, fauces, or pharynx, carious teeth, middle-ear disease, or eczema of the scalp, have been the lesions preceding the tubercular infection.

About two-thirds of the patients gave a tubercular family history.

Experience in this service has convinced us that, although a gland thus infected may remain quiescent for a long time, may undergo caseation or softening, or, if subsequently infected with pyogenic microorganisms, may suppurate, it rarely undergoes spontaneous resolution. Most of the patients had been treated locally and constitutionally for long periods before applying for relief by surgical measures, apparently without benefit in any individual case. The propriety of removing such diseased glands is undoubted. Objections have been made on the grounds that an operation may kindle a latent tubercular affection, or cause a local disease to be rapidly disseminated. With regard to the former, it must be remembered that latent tuberculosis of these glands frequently becomes active without discernible cause; the latter objection is largely theoretical; both lack the support of experience. Neither of these untoward results has occurred in this service. Moreover, operation insures

a much less conspicuous scar than when the diseased glands are allowed to open spontaneously.

The method of operation depends upon the stage the disease has reached. If softening has not occurred, excision is preferred, and all enlarged glands are removed, the wound being closed as in any other non-infected wound. If softening or suppuration has taken place, erosion is selected; or if all diseased tissue cannot be removed in this way, combined excision and erosion are employed, all infiltrated or ulcerated skin being sacrificed. In those cases in which a clean excision has been impossible and primary union cannot be expected, the cavity is swabbed out with a solution of zinc chloride, 30 to 60 grains to the fluidounce of water, and the wound is packed with iodoform gauze. Even with the greatest care, minute infected glands may be left behind and recurrence sometimes follows. These are removed as soon as they are detected.

Some of the operations upon the neck have been extremely delicate and tedious, requiring prolonged and careful dissections. The sheath of the great vessels was usually exposed, and not infrequently the growth was intimately adherent to it. In two cases lateral ligatures were applied to the internal jugular vein to check bleeding occasioned by the tearing away of small veins at their point of entrance to the main trunk; the tumor has frequently been found in close relation to the transverse processes of the cervical vertebræ. In one case it was necessary to divide the omohyoid and sterno-mastoid muscles, the superior cervical plexus, the spinal accessory nerve, and the external jugular vein, in order to remove the entire mass. In some instances the chain of glands was followed as far as the subclavian vessels. The patients all made satisfactory recoveries. When the wounds were closed, prompt union followed. The wounds in the cases which were treated by the open method, granulated rapidly and closed firmly.

One non-operative case may be mentioned, which, when measured by its results, is of considerable importance. This patient was treated by deep injections of a sterile 10 per cent. emulsion of iodoform in glycerin.

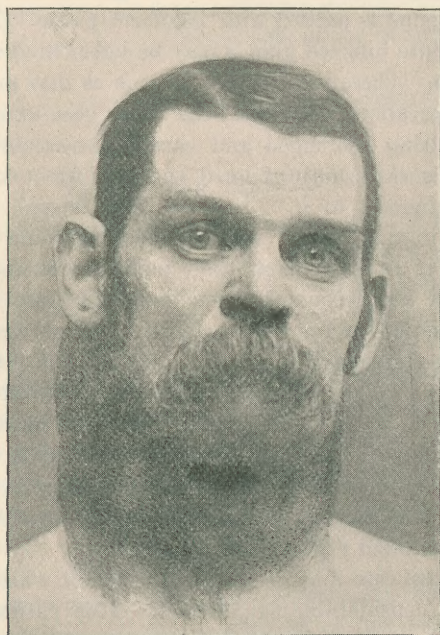
Whether the favorable result in this case is due to the specific influence of iodoform on the tubercle bacillus, or is brought about by what Lannelongue terms sclerogenesis—*i. e.*, the conversion of the tuberculous infiltrate into fibrous tissue, which encapsulates and destroys or renders innocuous the bacillus—is still *sub judice*. The majority of surgeons believe that iodoform acts as a specific, though injections of irritating solutions, such as chloride of zinc, have given good results in certain forms of surgical tuberculosis.

The case is as follows:

T. S., male, aged forty-four years, married, butcher, applied for advice on account of a large, hard, firmly fixed growth on the right side of the neck,

lying under the sterno-mastoid muscle, and apparently involving it and the anterior edge of the trapezius in the diseased process. The infiltration followed the course of the sterno-mastoid as far as the clavicle (Fig. 1). It was irregularly lobulated. A smaller lump was found just beneath the chin, and a similar but less marked infiltration existed on the opposite side of the neck. About the neck were scars marking the site of six previous operations for the removal of enlarged glands. The grandfather and an aunt of the patient (both on the mother's side) died from consumption. The seat and appearance of the growth, its chronic, sluggish course, the absence of inflammatory symptoms and pain, its solid character, and the frequent recurrences led to the diagnosis of tubercular adenitis. The small fluctuating tumor under the chin was excised. The large mass on the side of the neck, however,

FIG. 1.

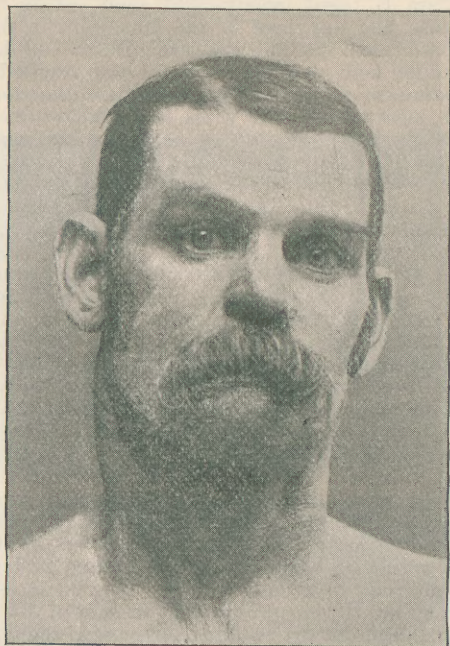


Tubercular adenitis with infiltration of surrounding tissues.

seemed so extensively diffused, had infiltrated and involved so many of the adjacent tissues, and would have required for its removal such an extensive destruction of important structures, that it was decided to employ deep injections of iodoform. For this purpose a mixture was made of sterilized iodoform 1 part and boiled glycerin 9 parts. Ten minims of this were injected deeply into the tumor at different points, at intervals of ten days. To avoid throwing the mixture directly into the circulation the hypodermatic needle was first driven into the indurated mass; if no blood flowed through this the syringe was attached and the iodoform-glycerin was injected. Twelve injections were given. Each occasioned slight ephemeral pain, and local reaction lasting not over forty-eight hours. Under this treatment the swelling has almost entirely subsided, merely a general thickening remaining (Fig. 2). While the patient was under observation, other glands became enlarged, but entirely disappeared after the use of the injections. The patient's general condition

has greatly improved; he is cured of a cough from which he suffered for months, has gained in weight, and is again working at his trade.

FIG. 2.



Effect of treatment by iodoform injections.

TUBERCULAR ARTHRITIS.

Five cases of tubercular disease of the knee-joint have been subjected to operation, and one case has been treated with injections of iodoform and glycerin.

CASE I.—Lucy C., aged fourteen years; disease of one year's duration. The knee had the characteristic appearance of tubercular arthritis of this joint. Arthrectomy was performed, all infected tissue being removed, including a point on the internal condyle having a suspicious appearance. The divided ligamentum patellæ was sutured and rubber drainage was introduced. The wound was dressed antiseptically and fixation was obtained by a Gooch's splint. Healing was satisfactory and the patient recovered with fibrous ankylosis in the straight position, without any shortening.

CASE II.—G. K., male, aged twenty-seven years; suffered from tubercular inflammation of the knee-joint. As the disease was apparently limited to the synovial membrane, the operation of arthrectomy was performed, as in the preceding case. The patient recovered with a useful limb.

CASE III.—W. C., aged twenty-six years; suffered from extensive tubercular disease of the knee-joint and contiguous structures. Excision was performed, but the tubercular involvement was too widespread to be entirely removed by the operation; sinuses remained which continued to discharge, and it became necessary to perform amputation at the lower third of the thigh. Prompt healing followed.

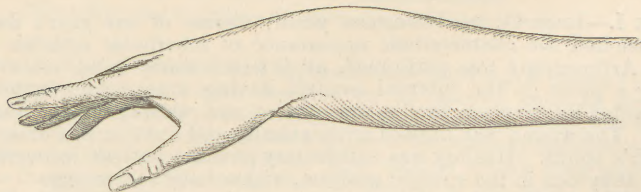
CASE IV.—H. R., male, aged eleven years; suffered from tubercular disease of the left knee-joint. Excision was performed. The wound was drained, sewed with silk-worm-gut, and dressed antiseptically, after which a Gooch's splint was applied. The patient recovered with firm union.

CASE V.—Clara L., aged twenty-eight years, owing to a long-standing tubercular disease, had ankylosis of the knee-joint in the flexed position. Excision was performed, the limb was straightened and dressed. As in the last case, firm union took place, and a useful limb resulted.

CASE VI. *Tubercular arthritis of knee, treated with injections of iodoform and glycerin.*—J. M., aged twenty-nine years, had some trouble in the knee-joint when nine years of age. Four years ago the same joint again became affected and afterward was never free from pain, which was always increased by use. The part became swollen, and for six months before admission the trouble had steadily grown worse. There was, however, no displacement, the range of motion was good, and the case was thought to be a favorable one upon which to try the effect of injections of iodoform. The joint was opened by small lateral incisions, and about one-half an ounce of flaky serum was evacuated. The joint cavity was irrigated with 3 per cent. boric acid solution, a 10 per cent. emulsion of iodoform in glycerin was injected, and the wounds were closed by suture. The reaction was marked, the entire limb becoming cedematous. Lead-water and laudanum were applied and the foot elevated; by the sixth day the cedema had disappeared. These injections were repeated at intervals of four days for two weeks, a half-ounce of the iodoform mixture being used each time. They occasioned but little pain and were followed by slight inflammatory reaction. The patient left the hospital much improved, promising to report at a later period, but has failed to do so.

CASE VII. *Tubercular inflammation of the wrist-joint treated with injections of iodoform and glycerin.*—J. B., aged twenty-one years. Fifteen months before applying for treatment he received a blow on the right wrist. There was slight swelling at the time, which disappeared under treatment. The swelling about the joint invariably followed upon its excessive use. Fifteen weeks ago he was compelled to quit work on account of the increased swelling and pain. A fusiform, doughy swelling surrounded the joint from the lower fourth of the arm to the metacarpo-phalangeal articulation. When this swelling was palpated, roughened and movable bones could plainly be felt. The hand was slightly flexed at the wrist, the fingers were extended, withered, and absolutely stiff. (Fig. 3.) The case seemed about as unfavorable as it well could be, but as amputation of the right hand in a young man is such a grave proceeding it was determined to make the apparently hopeless effort to save the part.

FIG. 3.



Tubercular arthritis of wrist-joint.

The ulnar aspect of the joint was accordingly punctured with a fine aspirating needle and two and a half ounces of typical tubercular pus were withdrawn. A 10 per cent. emulsion of iodoform in glycerin (3ij) was then injected into the abscess cavity. Considerable inflammatory reaction followed the injection, but this gradually subsided. The injections were repeated at intervals of about a week for two and a half months, from one to three drachms of the emulsion being driven each time into all parts of the

tubercular infiltrate. The abscess cavity became obliterated after the third injection; at about the same time pain disappeared, the swelling steadily subsided, the fingers became more movable, until in a few months the patient had a useful, painless hand, showing a scarcely perceptible enlargement about the wrist-joint. Under date of November 15, 1892, he writes that he can lift a pail of water with that hand and has no pain. The accompanying cuts, from photographs, represent the appearance of the part at this time. (Figs. 4 and 5.)

FIGS. 4 AND 5.



Effect of treatment by iodoform injections.

This result is particularly striking, since the wrist case was so advanced that no surgical operation other than amputation could even be considered. In the neck case (p. 42), treated by the same method, the infiltration was so extensive that thorough removal by the knife was out of the question. The knee case would ordinarily have been subjected to at least an arthrectomy. The treatment bade fair to render any operation needless, but, unfortunately, the patient has not recently been heard from. This treatment in joint cases is being tested by König, Bruns, Billroth, Krause, and the majority of the leading German surgeons. The curative effects appear to us to be due partly to the germicidal influence of the iodoform, partly to its stimulating action

on the healthy tissues surrounding tubercular foci (see p. 44). In the above cases improvement was noted after the first few injections. No symptoms of iodoform intoxication were noted, and unless ether is used as a solvent there seems little danger from these parenchymatous injections.¹

ANEURISM.

Five patients have applied for treatment on account of aneurisms. Three of these have been of the popliteal artery, one was a left femoral varicose aneurism, and the fifth a diffuse traumatic aneurism at the middle of the arm. Two of the cases of popliteal aneurism were cured by compression; in one this failed.

CASE I. *Popliteal aneurism.*—Mr. B., aged twenty-five years, was sent by his physician, Dr. Alison, on account of a pulsating tumor about the size of a goose-egg in the right popliteal space. Digital pressure was applied for forty-two hours; this resulted in considerable reduction in the size of the aneurism as well as in its pulsation. Careful palpation, however, demonstrated that a small quantity of blood was still passing through the sac. Rapid cure by Esmarch's bandage was then attempted, the elastic roller being firmly applied above and below the aneurism and carried over the latter with very light pressure. After two hours' trial of this method the compression was suspended, and the patient allowed to rest for a few days, when the femoral artery was ligated at the apex of Scarpa's triangle. The after-treatment consisted in elevating the limb on a pillow and enveloping it in cotton. The wound healed by first intention, and the patient recovered without incident. The circulation in the limb remained fair throughout. This was probably largely assisted by the preliminary digital compression. This was a most unfavorable case, owing to the poor constitution of the patient, who was the subject of advanced mitral heart disease, and was also a confirmed rheumatic. He had a small aneurism of the left axillary artery, which did not tend to increase in size, and was therefore not treated, but simply kept under observation. For these reasons it was feared that ligation of the artery might lead to the development of another aneurism at the seat of ligation, but this has not occurred.

CASE II.—H. L., aged forty-two years; colored; had acute articular rheumatism and smallpox in 1862; had engaged to excess in athletic exercises. In the spring of 1891 pain and a sensation of weakness in the right popliteal space were first noticed. In the following fall he detected a pulsating swelling. In January, 1892, he came to the hospital. The treatment consisted of rest in bed, with the limb flexed and elevated on a pillow. Iodide of potassium and aconite were administered internally, and digital pressure of the femoral was continued for fifty-four hours, after which moderate pressure was kept up by a horseshoe tourniquet for ten hours; a roller bandage was then placed in the bend of the knee, and the limb flexed, bandaged, and retained in the flexed position. During the treatment the aneurismal sac gradually diminished in size; pulsation entirely ceased, and did not return. The patient was allowed to get out of bed at the expiration of a month, and he left the hospital entirely cured.

¹ During the last year, Dr. White has had a successful result in a case of obstinately recurring tubercular caries of the trochanteric region, which had resisted three extensive operations, by the free use of a 25 per cent. emulsion of iodoform in boro-glyceride. This was injected into sinuses and retained by packing. The patient has for the first time in three years a firm, healthy cicatrix, already six months old, and has no symptoms of bone trouble. The case is not included in the above series, as she was not treated in the hospital.

CASE III. *Popliteal aneurism*.—T. G., male, aged thirty-two years, presented an aneurism of moderate size in the popliteal space, which was treated as in the preceding case, with the same result.

CASE IV. *Left femoral varicose aneurism*.—Mr. K., aged twenty-nine years, came for treatment on account of a large pulsating tumor just below Poupart's ligament, the result of an old gunshot wound. The swelling presented the typical symptoms of a varicose aneurism. Ligature of the iliac was advised. This being positively refused, pressure by means of shot-bags was applied for four weeks. Partial consolidation of the aneurism apparently resulted, but later rupture occurred, with enormous extravasation into the tissues of the thigh. In consequence, amputation just below the trochanter was necessitated in spite of the patient's unfavorable condition. The patient suffered from an extreme degree of shock, both before and after operation. Death occurred in seventy-nine hours, without reaction having occurred. The external iliac vein and artery were enormously dilated; the vein was as large as the small intestine, the artery three times its normal calibre; the walls were exceedingly thin, and rupture of the vein had taken place about the level of Poupart's ligament. The channel of communication between the two vessels was scarcely large enough to thrust a lead-pencil through.

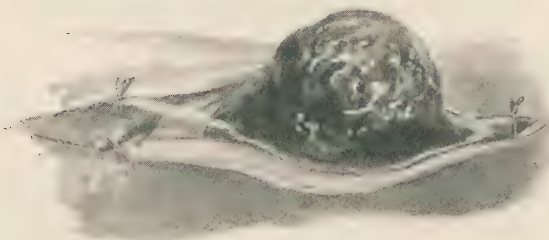
CASE V. *Diffuse traumatic aneurism*.—W. S., aged fifty-three years, received a shot from a 32-calibre revolver eleven years ago, the ball entering the arm anteriorly at the junction of the middle and lower thirds, passing out posteriorly. He bled freely. A wound of the brachial artery was diagnosed; hemorrhage was checked by packing. After cicatrization, a hard mass about two inches in circumference remained. This became painful when he did

FIG. 6.



Diffuse traumatic aneurism of the brachial artery.

FIG. 7.



Traumatic aneurism laid open and vessels tied.

any hard work. During the four or five weeks previous to admission the tumor became very sensitive, the surrounding tissues were inflamed, and severe lancinating pains shot through the hand and forearm. Suddenly the tumor began to enlarge, and was found to be pulsating. The patient was brought at once to the hospital, and was found to be suffering from a diffuse traumatic aneurism. The entire arm was enormously swollen (Fig. 6), the pulse at the wrist was lost, and the hand was cold. *Operation*: An Esmarch

bandage and tube were applied and a free incision was made in the line of the brachial artery. All the tissues were infiltrated with clotted blood and matted by inflammatory exudate. The sac was freely opened (Fig. 7), and all the clots were turned out. The ruptured artery was found and traced up to a point where its walls were healthy, and there tied with catgut. The distal vessels were more difficult to find, but were finally secured. The wound was drained and closed. The arm was put on an anterior splint and elevated. The radial pulse appeared on the second day. Healing by granulation followed, and the patient recovered without the slightest impairment of function.

"Murray's treatment"—that is, encouraging the rapid formation of a red clot by firmly applying an Esmarch bandage below the aneurism, carrying it lightly over the distended sac, then occasioning further engorgement and blood stasis by taking four turns of the Esmarch above the aneurism—was not successful in the single case in which it was applied. Against digital pressure the objection has been raised that it so contuses the parts that should a subsequent ligation be necessary, the risks of operation are greatly increased. Our experience has not corroborated this theoretical objection, which is more than counterbalanced by the establishment of collateral circulation, which digital pressure favors. Ligation above and below, with excision of the sac, is the method preferred in this service in cases of traumatic aneurism, whether diffused or circumscribed.

EXCISION OF THE ELBOW.

Eight excisions of the elbow have been performed. The posterior straight incision was employed. Whenever possible the periosteum was carefully dissected from the bones. The brachial artery at the bend of the elbow, and the ulnar nerve as it passes in the groove between the olecranon and the internal condyle, are the important structures to be avoided. The attachments of the brachialis anticus and biceps in front, and of the triceps and anconeus behind, were spared as far as possible. The wounds have always been drained through and through. Anterior angular splints were used.

Particular attention was paid to the after-treatment. At each dressing gentle passive motion was made, and until the wound healed splints with different angles were applied when the dressing was changed. When gentle passive motion occasioned much pain, or did not seem to result in sufficient freedom of flexion and extension, ether was given to the full stage of anæsthesia and moderate force was employed. In some cases this was repeated twice a week for months at a time. In the arthritic cases the nutrition of the wasted muscles was restored by faradism and massage repeated daily, splints were discarded after the seventh day, and patients were encouraged to use the arm.

CASE I. *Luxation and necrosis*.—T. H., aged twenty-nine years, injured the elbow-joint by falling three months previously. This injury was diagnosti-

cated as a fracture, and the arm dressed in plaster-of-Paris. In a short time this was substituted by a felt splint, and passive motion was begun. As the arm remained swollen, without motion at the elbow, and with neither motion nor sensation of the fingers, he was brought to the hospital. A large collection of pus about the joint was evacuated, the radius and ulna were found displaced posteriorly, and the head of the radius and condyles of the humerus were necrosed. Excision of the joint was performed. The patient recovered with moderate motion in the joint and a return of motion and sensation in the fingers.

CASE II. *Old fracture; vicious union.*—Willie W., aged nine years; eleven weeks before admission, fell and sustained an injury in the neighborhood of the elbow-joint. An anterior obtuse-angle splint was applied. After recovery the joint was found to be immovable; for the relief of this condition he was brought to the hospital. On examination the internal condyle was found to be absent from its normal position, and in front of the joint there was felt a hard, bony mass, which was thought to be the displaced condyle, increased in size by the formation of callus, and mechanically interfering with the movements of the joint. An incision being made, the diagnosis was found to have been correct. The joint itself was normal. The obstruction was removed. Rapid healing occurred, and a joint functionally perfect resulted.

CASE III. *Septic arthritis.*—Theresa H., aged twenty two years, following an abortion, was seized with acute inflammation of the elbow-joint. This was treated by rest, ichthyol ointment, and later by blisters. Improvement was very slow, and the patient passed from observation. She returned later, however, free from the symptoms of inflammation of the joint, but with such firm ankylosis in the position of full extension that excision was necessitated. Healing was prompt. A considerable range of motion was preserved in the joint, which she was able to use for all domestic work.

CASE IV. *Tubercular arthritis.*—Boy, aged three years, suffering from tubercular joint disease, with profuse suppuration. There was much wasting. On incision, the joint was found disorganized, and the ends of the bones carious. Resection was performed and the wound drained. The patient made a good recovery, with a functionally satisfactory joint.

CASE V. *Suppurating tubercular joint.*—Male, aged forty-six years, partially ankylosed in the extended position. Excision was performed. The functional result was satisfactory.

CASE VI. *Tubercular arthritis.*—S. R., male, aged forty years. An abscess was evacuated, and the joint explored. Caries of the coronoid process, and of the internal condyle was found. These diseased portions were removed. The patient recovered with a useful joint.

CASE VII. *Necrosis*—E. B., male, aged four and a half years, was subjected to excision of the elbow, on account of necrosis of this joint following injury. The patient made a satisfactory recovery, with a fair range of motion.

CASE VIII. *Tubercular arthritis.*—Female, aged three years. Tubercular arthritis, with extensive involvement of the soft parts. Excision was performed; a functionally useful joint resulted.

LUPUS OF FACE; CURE BY TUBERCULIN.

Mr. J. W., of Titusville, aged fifty-nine years in 1890, had been under treatment for two and a half years for an ulcer of the face, occupying the left cheek, the parotid region, and the side of the neck, and measuring on an average about four inches in diameter. (Fig. 8.) It began on the side of the face in front of the upper portion of the ear, as a small scab, which steadily extended, and under which ulceration developed.

The diagnosis by the various surgeons whom he had consulted, and who treated him, had been epithelioma. He had been in the hands of four men of experience, some of them of excellent position in the profession. He had had eight cutting operations performed, besides numerous plasters and other local applications.

At the time he came under my care I was using the newly-discovered

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Koch's lymph, now known as *tuberculin*, or *paratoloid*. He remained in Philadelphia three weeks, during which time he received in the lumbar

FIG. 8.



Lupus of face and neck.

FIG. 9.



Effect of treatment by injections of tuberculin (Koch's lymph).

region six injections of this material, beginning with 0.1 milligramme, and increasing in strength up to 0.5 milligramme each. A distinct local reaction

(at the side of the sore) occurred after each injection, diminishing in intensity with the later ones; no local treatment was employed. At the end of the three weeks healing had so far progressed that it was thought proper to let him go home, and ten days later the ulcer was entirely healed. He now, twenty-three months later, presents a sound and permanent scar. There has never been the slightest solution of continuity since that time. The illustration (Fig. 9) shows the extent and position of the cicatrix.

This case is of more than usual interest on account of the length of time which has now elapsed since cicatrization occurred. As yet but few permanent cures by the use of paratoloid have been reported. Cheyne, by a system of continuous and increasing dosage, has obtained rapid healing in a number of cases, which remained in good condition for some weeks. In this patient the previous failure of a number of operative procedures, and a great variety of local applications, and the prompt, satisfactory, and apparently permanent healing which followed the use of tuberculin, all local treatment being withdrawn, strongly emphasize the unique properties of that remedy. It would seem that even if success from its use is only occasional, it may occur in such desperate and otherwise hopeless cases that it is worth more frequent trial than the profession, in the reaction from its too extravagant anticipations, is now giving it.

DELAYED UNION AND UNUNITED FRACTURES.

Cases of delayed union and ununited fracture in this service are treated according to their duration, in the following manner: Recent cases, by reapplication of dressings insuring perfect immobilization; older cases, by frictions or by encouraging the functional use of the limb, aiding it by means of apparatus; still older cases, by resection of the ends of the fragments and fixation by splints, or, if the position favors it, by pins. The use of wire has been abandoned as altogether unsatisfactory. When large portions of bone have been removed, and very long continuance, or extensive disease, or unfavorable position of the fracture, demand both absolute fixation and stimulation of condensed and atrophied bone, the plate figured on page 15, and used in cases V. and VII., has been found invaluable. Hennequin¹ has recently published a series of unsuccessful cases of osteotomy and wiring for ununited fracture, and is inclined to attribute his failures to some constitutional condition interfering with repair. They certainly illustrate the need for some more thorough and satisfactory method of fixation than the wire suture. This we believe will be found in the use of this plate in appropriate cases.

CASE I.—Man; fractured clavicle six weeks old, treated by Velpeau bandage. There was no bony union. The man was put to bed, in the supine position, on a hard mattress, and with a very small pillow for the head. At the end of a month the bone was firmly united.

¹ Revue de Chirurgie, August, 1892.

CASE II.—Boy, aged eleven years; fracture of the upper third of the femur. Treatment: extension and sandbags. Distinct motion was found at the end of six weeks; moderate friction was made, and the dressings reapplied. Four weeks later there was no improvement. The boy was then etherized, and the fragments vigorously rubbed together. The same dressings were reapplied. Six weeks later firm union was found to have occurred.

CASE III.—W. S., male; fracture of the tibia two months before coming under observation. Union had not occurred, although friction had been practised. The bone was in good position, and it was therefore thought best to get the patient about. A brace was ordered, and the patient was allowed to walk. At the end of six weeks the bone had united perfectly.

These three cases illustrate as many methods of treating delayed union. In the first, perfect rest was followed by healing. In the second case vigorous friction, followed by immobilization, was necessary. In the third case, the continued irritation produced by walking was necessary to effect a cure.

CASE IV.—A railroad employé applied for treatment on account of an ununited fracture of the left ulna, at the junction of the middle and upper thirds. The condition was of some months' standing; the usual milder measures had been unsuccessfully employed before coming to the hospital. Crepitus and motion at the seat of the fracture were very apparent. An incision was made over the seat of injury, and after the soft parts had been dissected away, an S-shaped fracture was found. The dense fibrous tissue and lymph between the ends of the bone were removed with a small chisel without altering the line of fracture. The two ends of the bone were then drilled, and held together by a single screw. The wound was dressed antiseptically, an anterior splint applied, and the arm suspended in a sling. At the end of a month the screw was removed, when firm union was found to have occurred. The tract left after the removal of the screw closed by granulation in about a week, and the patient was dismissed well.

CASE V.—Miss J., nineteen years of age, received a compound fracture of the humerus, about two inches below the acromion, the result of a fall eighteen months before coming to the hospital. At the time of the accident an internal angular splint was applied. The bone made no attempt at union; the ends were therefore rubbed together and the splint reapplied, but without success. The attending physician then cut down on the seat of fracture and curetted the ends of the bone, and the arm was again fixed with a splint. Union still did not occur. She then consulted a surgeon, who drilled and wired the fragments. The bone not only failed to unite, but an infected sinus remained open. She then came to the University Hospital. The seat of injury was cut down upon, and by means of the chisel and saw, an oblique section of each bone was made and the freshened surfaces placed in apposition, and secured by a long screw. The sections of bone were eburnated and non-vascular, and promised but feeble reparative efforts. The screw became loose in about three weeks, and was removed. At the end of six weeks the wound had completely healed, but the bone had not united. After an interval of some weeks another attempt was made to restore the patient a useful arm. An incision was made in the line of the old cicatrix; transverse sections of the bone were made until the cut surface appeared healthy. After accurately fitting the ends together two holes were bored in each fragment of bone corresponding to the holes in a metal plate prepared to retain the fragments. Screws were then passed through the plate into the bone, thus holding the fragments in close and fixed apposition. The arm was dressed to the side and kept immobile for seven weeks, when the patient was again etherized for the purpose of removing the plate. Ten days later the external wound was firmly healed, and a careful examination showed that the bone had united firmly.

CASE VI.—Mr. J. presented the characteristic deformity of a Pott's fracture, which had occurred nine months previously, which had become exaggerated by attempts at walking. Examination showed the internal malleolus to be absent from its normal position, and a prominence was felt in front of the astragalus. Crepitus and preternatural mobility were detected in the fibula about three inches above the external malleolus. An incision was made along the inner border of the tibia and extended to the tuberosity of the scaphoid. The displaced internal condyle was chiselled loose, and the surface freshened for it in its normal position, where it was wired. An incision was made over the seat of fracture in the fibula, and after considerable dissection and the free use of the chisel, the fragments were restored to their proper position. Drainage-tubes were inserted, the wounds were dressed antiseptically, and the foot was placed in a fracture-box. At the end of six weeks the patient was allowed to go about with a plaster-of-Paris dressing on the foot. The result was highly satisfactory; all deformity had disappeared, the patient walked with ease with a cane, and a considerable degree of motion returned in the ankle.

CASE VII.—Mrs. R., aged forty-two years, was brought to the hospital by Dr. Downs, of Dover, Del., on account of an ununited fracture of the humerus. Eight years ago the patient first experienced an aching pain in the right arm; this steadily grew worse. The elbow-joint became somewhat stiff, and was at times swollen as were also the hand and forearm. There was marked loss of power, and the hand could not be carried to the head. Examination during this period failed to show any cause for her suffering, and the trouble was considered to be rheumatic. The patient had had attacks of pain over the left chest, which were attributed to rheumatism. Otherwise her health had always been good. Some of her mother's family were consumptive, and one maternal aunt died of cancer of the breast.

FIG. 10.

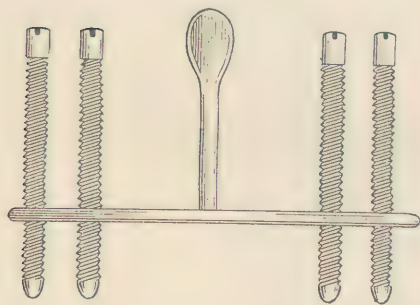


Plate for fixation of ununited fracture after resection.

FIG. 11.

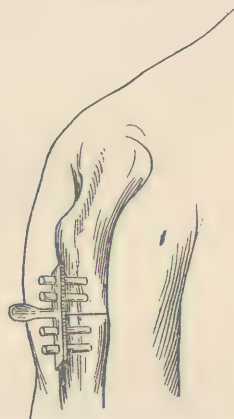


Diagram of plate in position: Case VII. (Cf. Case V.)

Without any apparent change in her condition, the right humerus broke at the junction of the upper and middle thirds, in August last, while the patient was in the act of raising her nine-months-old baby to her shoulder. A posterior splint was applied with an anterior trough. As this failed to fix the fragments, a plaster cast was applied. It was found necessary to change this every week as it became loose. After wearing the cast six weeks continuously the fracture had failed to unite and the patient was sent to Dr. White. Crepitus was distinct on motion, and there was no callus thrown out

about the ends of the bone. The pain in the arm was relieved in part after the fracture had occurred.

When exposed by incision the seat of fracture was found to be enveloped in a mass of partially organized tissue strongly suggesting sarcoma; on carrying the knife through this down to the bone, there escaped several drachms of thick liquid containing fibrinous shreds, much like the contents of a cold abscess. There was absolutely no attempt at repair. The ends of the bone were irregular, jagged, and partly absorbed. They were resected, exposing beyond the area of partial absorption dense eburnation. Additional cross-sections were removed till the bone appeared fairly healthy and distinctly vascular. In all, an inch and a quarter of the shaft of the humerus was resected.

After securing good apposition of the two freshened bone-ends, the plate shown in Fig. 10 was put in position. (Fig. 11.) Four holes were drilled. This plate held the bone so firmly that on raising the arm by the elbow the humerus moved as a whole, exactly as though there was no fracture. The wound was packed with iodoform gauze and a pasteboard moulded splint embracing the shoulder, arm, elbow, and forearm was so applied that without removing the splint the dressings could be changed.

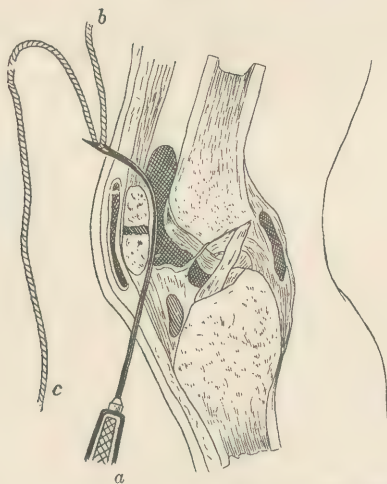
The wound remained sterile for many days, then there was some suppuration. The patient has felt no motion in the arm, none has been detected during the occasional changes of the splint, and the pain from which she suffered for eight years is entirely relieved. It is too soon yet to decide whether there will be bony union or not.

FRACTURE OF PATELLA.

In this relation two cases of fracture of the patella may be described, which were both subjected to operative interference:

CASE I. *Barker's method*.—A man, aged twenty-three years, broke his patella by making a misstep in alighting from a train. He was seen the next day. The joint was distended with blood and the fragments were widely separated. Barker's operation, the most recent operative procedure in this

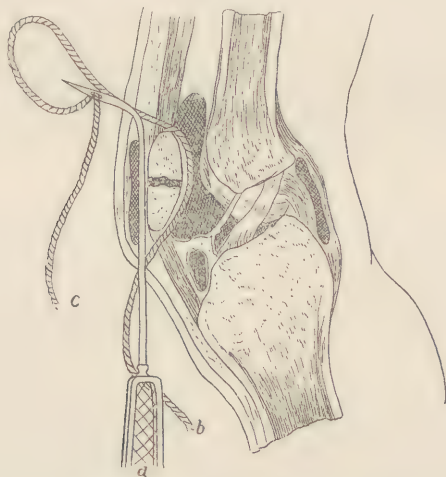
FIG. 12.



Barker's operation for transverse fracture of the patella. First stage. *a*. Needle. *b*. End of ligature to be threaded and conducted behind fragments. *c*. Free end of ligature to be brought in front of fragments.

fracture, was performed as follows: The lower fragment of the patella was steadied by the finger and thumb, and a narrow-bladed knife thrust into the joint, edge upward, in the middle line of the ligamentum patellæ at its attachment to the lower fragment. Through the wound thus made a stout-handled pedicle needle was thrust into the joint behind the lower fragment, and pushed up behind the upper fragment and through the quadriceps tendon in the middle line as close to the border of the bone as possible, the upper fragment at this time being forced down and steadied. When the point of the needle became apparent beneath the skin the latter was drawn upward and an incision made upon the needle, the eye of which was then threaded with sterilized silk or wire (Fig. 12) and the needle withdrawn, carrying the thread behind the fragments. The needle was next unthreaded and passed through the same skin wound below and out of the upper wound, but this time in front of and close to both fragments. Here it was threaded with the upper end of the suture (Fig. 13) and withdrawn. The two fragments were then brought together, friction was made to displace clots or other foreign material, and the ligature tied tightly over the lower border of the patella. The two ends of the ligature were cut short and the wound closed. Union of the skin wounds was by first intention. Passive motion was begun on the tenth day. The patient was out of bed on the thirteenth day, walking without much difficulty. He left the hospital at the end of three weeks with a very useful knee. The range of motion and general usefulness are now (November 19), ten months after the injury, as good as on the other side.

FIG. 13.



Barker's operation for transverse fracture of the patella. Second stage. *a.* Needle. *b.* Inner portion of ligature in position. *c.* Opposite end of ligature threaded and ready for withdrawal, leaving it in front of the fragments.

CASE II. *Stimson's method.*—This patient was also a young man in whom the fracture was the result of muscular action. He was seen the day of the accident. A strong silk suture was carried, by means of a perineal needle, through the ligamentum patellæ, up by the side of the patella, then through the quadriceps tendon, and down to make its final exit at the point of beginning. It was then drawn tight and knotted, while the fragments were approximated. The ends were cut short, and it was left as a buried suture. At the end of three weeks there was still slight motion between the fragments. At five weeks the patient was discharged, with very close fibrous union, and with excellent use of the limb.

HEAD INJURIES.

All depressed fractures, whether simple or compound, or whether brain symptoms were present or absent, were elevated. This treatment is in accordance with the practice of the great majority of modern surgeons; and in view of the number of cases not thus treated, who suffer from various forms of cerebral irritation or disease, it seems unfortunate that it was not the rule of practice long ago. The operation in itself is almost free from risk. Some of the simpler cases were closed without drainage; the compound comminuted fractures were drained by silk or a small tube.

Trephining.—Of eight cases, six recovered and two died. The two fatal cases succumbed soon after admission from the violence of the injuries. In one instance there was extensive fracture at the base with laceration of the brain. In the other case there was much laceration of brain tissue at the seat of fracture. The patient died without reacting.

One patient was trephined for *traumatic epilepsy*. A flap was raised which included the scar of an old injury, and a button of bone was removed. The bone section showed eburnation. The opening was enlarged with the rongeur until the skull presented a healthy appearance. A mass of greatly thickened dura was removed. Union by first intention was obtained. The patient had no more fits while in the hospital. A recent note from his physician, Dr. I. N. Leyda, of Allegheny, Pa., states that for six months after returning to his home he remained absolutely well. Later light attacks recurred, which gradually became more frequent, and his intellect failed. He died recently from rupture of a cerebral artery.

In four cases of *epilepsy* following blows upon the head, the scar resulting from the injury was excised. Primary union followed in all cases, and all remained free from convulsions during their stay in the hospital, and for various periods subsequently. These cases, added to those I have previously reported,¹ make twenty-four cases of supposed traumatic epilepsy, all of which were at least temporarily benefited by operation.

Trephining for old depressed fracture, with delusions of persecution.—S. S., aged fifty-seven years, sent by Dr. Allport, of Phillipsburg, Pa., received a head injury twenty years before coming under observation. Two years before admission it was noticed that his memory was beginning to fail, he became irritable, and was the victim of delusions of persecution. He was rational on most affairs, but had delusions of persecution. Examination of the head showed a depressed scar on the right side, in front of the parietal eminence, and two inches from the median line. The bone was found to be deficient, and the pulsations of the brain could be felt through the scalp. A flap was raised in the usual manner. As it was being dissected from the edges of the opening in the skull a cyst was exposed, about the size of a pigeon's egg, which was encroaching upon the brain substance. The cyst was opened and drained. Its wall was thin, and through it could be plainly seen the brain convolutions beneath. Following the operation there was marked improvement. The delusions entirely left him, and he was able to

¹ Annals of Surgery, August and September, 1891.

pursue his business for upward of eight months, when in an altercation he received a heavy blow upon the head. Shortly after, his delusions recurred. He was then readmitted to the hospital, and again operated upon on November 9, 1892. The cyst was found to be obliterated, its site being occupied by a dense fibrous mass, a quarter to three-eighths of an inch in thickness, consisting undoubtedly of the collapsed cyst walls, and constituting practically a thickened scar of brain tissue. This was dissected out, together with some healthy brain structure on either side. The wound healed in five days by first intention. The immediate effects of the operation are most striking. The patient, who for the week previous had required constant watching and restraint, and was gloomy when he was not violent, became at once rational, cheerful, and docile, and so remains. It is too much to hope, however, that this will be permanent.

Persistent headache.—Florence C., aged twelve years, received a scalp wound at the age of eight years. This suppurated for a long time. A year later she began to suffer from severe headache. For three years this was constant and increasing in severity, so that she had to be taken from school. The scar was excised and a button of bone was removed. The operation afforded immediate relief, the pain has not recurred, and the child has attended school regularly.

Compound comminuted fracture over the superior longitudinal sinus.—M. S., aged thirty years. The bone was driven into the brain to the depth of an inch. On elevating it there was furious hemorrhage, the sinus having been torn completely across. The hemorrhage was checked by iodoform packing, and the patient made an uninterrupted recovery, returning to his work in six weeks.

MALIGNANT TUMORS OF THE BREAST.

EXCISION of the breast for carcinoma has been performed thirty-five times during the period embraced in this report.¹ All of the cases recovered. Some of the patients were operated on while the cancers were still small; in most, the disease was well advanced. In performing the operation the usual elliptical incision was made, one extremity terminating in the axilla, and thus permitting of free access to this region. The breast was invariably entirely removed, and all affected skin sacrificed. The axillary glands were removed in every case, whether involved or not, principally by the use of the finger. The wounds were usually drained for twenty-four hours, and with few exceptions they healed by primary intention; the average time required for healing was about ten days. Many cases were completely healed in six days.

The observation that in a few cases operated on several years ago and in which suppuration occurred, the proportion of permanent cures is unusually great, has led Dr. White to suggest that possibly free suppuration may at times give an added security against recurrence, acting very much as would a strong irritant applied to the wound surface, *i. e.*, exciting an inflammatory reaction which may destroy the comparatively vulnerable cancer cells beyond the areas reached by the knife.

In clearing out the axilla the glands were removed from beneath the

¹ Sixteen cases have been operated upon by Dr. White at this writing (November 19th) since October 1, 1892, but are too recent to include in this series. It may be stated, however, that in all there was union by first intention.

pectoralis minor up to the clavicle. The axillary vein is the only vessel which is liable to injury. When possible, this vessel was exposed at once. Its exact position being known, the danger of wounding it is much lessened. In one case (not included in this series) its walls were infiltrated with cancerous growth. The diseased portion of the vein was resected, ligature being applied above and below. The patient made an uninterrupted recovery. The danger of opening the axilla has been magnified by some writers. In Dr. White's experience, which includes a large part of that of the late Dr. D. Hayes Agnew, an accident from this procedure has not been met with.

The only points in dispute at the present day in relation to the surgical treatment of breast cancer have regard to the extent of the operation. Butlin (*Operative Surgery of Malignant Diseases*) has advanced what seem to him good reasons for believing the removal of the entire breast to be unnecessary. Gross, on the contrary, recommended not only the removal of the whole breast and the cleaning out of the axilla, but also the sacrifice of all the skin covering the affected glands, leaving a large surface to heal by granulation.

As to the latter method, Dr. White believes that the "dinner-plate" incision involves an unnecessary sacrifice of skin, which subjects the patient to the prolonged and tedious convalescence attending a large granulating wound, and that it does not add anything to the security of the patient against recurrence. An elliptical incision which includes all affected skin best fulfils the requirements.

Although Mr. Butlin has probably made his position as strong as it is possible to do in objecting to the removal of the entire breast as a routine practice, still his arguments are not convincing. The tendency of malignant growths to extend beyond the possibility of recognition by the eye or the touch, and even by the microscope, is so well known that it seems the obvious duty of the surgeon to remove every particle of such tissue in the immediate vicinity of the growth that can be taken away without undue mutilation or deformity, and with a reasonable degree of safety to the patient. For these reasons, in this service the entire breast has been removed in every case of malignant disease. The same argument holds good with regard to the necessity for cleaning out the axilla. It is impossible by the touch to detect slight glandular enlargements in the mass of axillary fat, before removal, that are very apparent to the eye and may be distinctly felt after being removed. When the glands have become so enlarged as to be readily felt through the skin, the disease has probably passed beyond the lymphatics and a permanent cure can scarcely be hoped for, although operation is still indicated. It must not be supposed, however, that even this detail of operative procedure is universally accepted; one of the most competent and skilful of modern surgeons, Mr. Frederick Treves (*Manual of Oper-*

ative Surgery), advises against removal of the axillary lymphatics if the finger passed into the axilla through the upper end of the incision fails to detect enlarged glands, provided that the tissues right up to the fatty base of the axilla have been very liberally removed. The reasons for dissenting from this opinion have been given.

NEOPLASMS OF THE TONGUE.

Portions of the tongue have been removed in six cases. Of these operations, four were for carcinoma, one for a cyst, and the fifth for sarcoma. To give free access to the field of operation the cheek has been divided from the angle of the mouth backward to the masseter muscle on the side corresponding to the lesion on the tongue. Preliminary ligation of the linguals has not been found necessary. In two cases, however, a preliminary tracheotomy was done. The vessels were caught as the tongue was divided, after the manner of Whitehead. In no case was any difficulty experienced in tying the lingual arteries. Oozing from smaller vessels sometimes proved difficult to stop. The growth was removed together with a wide margin of healthy tissue, and when this was practicable the wound in the tongue was united with silk sutures. Where there was any doubt about the absolute extirpation of all diseased tissue, and in those cases in which it was not possible to sew the wound, chloride of zinc solution, thirty grains to the fluidounce, was brushed over the exposed surface. The zinc chloride is a powerful antiseptic, and in addition produces a slight superficial eschar, which, besides destroying any diseased tissue that may have been left, tends to prevent absorption of microbes or ptomaines during the first twenty-four or forty-eight hours preceding the development of granulation tissue.

The incision of the cheek was approximated by hare-lip pins. Special care was taken in the after-treatment of these cases, and the use of sprays and antiseptic mouth-washes every half-hour or hour was especially insisted upon. Sprays of peroxide of hydrogen followed by washing with phenol sodique in water 1:6, gave the best results.

In the case of sarcoma the same precautions were taken as in those of carcinoma. The wound healed promptly. It has been necessary at three different times subsequently to remove recurrent sarcomatous growths from the neck.

In the case of the cyst it was possible to enucleate the sac so that very little healthy tissue was disturbed. Healing was rapid in all of the cases. In three of the carcinomatous cases there has been no recurrence up to this time, fifteen months after operation; in the fourth there was apparent freedom for a few months, and then a rapid and extensive return, which fortunately soon resulted fatally.

TUMORS OF THE JAW.

Three cases of osteo-sarcoma of the inferior maxilla, two of the superior maxilla, an osteoma involving both superior maxillæ (Fig. 14), and a fibro-myxoma involving the lower jaw, were treated by excision. All of these patients recovered promptly and without complications. In the case of bilateral osteoma, both upper maxillæ were removed at the same time, the patient was not severely shocked, and recovered as rapidly as the cases of single excision, though the ultimate cosmetic result was not satisfactory. The operation, however, was undertaken for the relief of agonizing pressure-pain, and from this standpoint was entirely successful.

FIG. 14.



Osteoma of both superior maxillæ.

After excision of the superior maxilla the cavity was packed with iodoform gauze for twenty-four hours, and thereafter was sprayed with peroxide of hydrogen, and then washed with phenol sodique in water 1 : 6, hourly during the day, and kept packed with iodoform gauze during the night. In excision of the lower jaw, the mouth cavity was shut off by suture of the mucous membrane. As an added precaution, antiseptic mouth-washes were regularly employed at short intervals.

Myxoma of the inferior maxilla; excision.—H. A., aged seventeen years, was sent to the hospital by Dr. Dechert, on account of a tumor of four years' standing, involving the lower jaw. The only antecedent history that seemed to have any bearing upon the trouble was the fact that the temporary teeth were lost early, and the permanent teeth were late in appearing, although this may have been a mere coincidence. Examination showed that the left inferior maxilla was more than three times its normal size. The overlying soft parts were healthy. A free incision was made on the under surface of the tumor, parallel with the jaw, dividing all the structures down to the bone. The periosteum was elevated. The bone was disarticulated on the left side, and sawn through at the position of the canine tooth on the right side. The wound was drained and dressed antiseptically, antiseptic mouth-washes being employed at frequent intervals. The patient made a rapid recovery, with very slight loss of motion or of facial expression. His health is good at this writing, now a year after the operation. There has been no appearance of subsequent involvement of the remaining portion of the bone. Microscopic examination of the tumor showed the growth to be a fibro-myxoma. The bone had become a mere shell, covering this mucoid substance.

EMPHYEMA OF THE ANTRUM.

Two cases of empyema of the antrum were opened and drained. One presented typical symptoms, *i. e.*, œdema of the overlying soft parts, and a purulent discharge from the nose when the patient lay down and turned on the sound side. The other case gave no history of discharge, there was no œdema, and the symptoms simulated almost exactly those of a solid growth. Indeed, such a diagnosis had been made by surgeons, and the operation of excision had been advised. In one of these cases, the canine tooth being sound, the cheek was turned up and the antrum was entered through the canine fossa; in the other, the canine tooth was pulled, and a small gouge was pushed up through the alveolus. Both recovered completely, though in the latter instance there was extensive necrosis, a large portion of the superior maxilla being removed through the mouth, and without opening the cheek.

SARCOMA OF PAROTID REGION.

E. J., male, aged forty-nine years; two years ago first noticed a small excrescence below the right ear; this was removed by a silk ligature. Two months later a swelling began in the region of the parotid gland, which grew slowly at first and then more rapidly, and became painful. On incision, it was found that the parotid gland was filled with altered blood-clot, and that there was a hemorrhagic infiltration of the surrounding tissues. The disease seemed to have begun in the glandular or other structures superficial to the parotid, which though disorganized by ulceration of its capsule and pressure of extravasated blood, did not appear to be infiltrated with the sarcomatous elements. A small portion of the posterior part of the gland was, therefore, allowed to remain, and ligation of the parotid and section of the facial nerves were thus avoided. Good union, no facial paralysis. The absence of return at this writing, one year after operation, would seem to justify this procedure.

CARCINOMA OF PAROTID.

Female, aged seventy-two years, came to the hospital on account of a tumor of stony hardness in the parotid region. The swelling seemed limited mostly to the gland, except at its upper portion where the skin was adherent and ulcerated. The entire parotid gland was extirpated, together with the affected skin, extending up as far as the temporal region. It was necessary to tie the external carotid artery, and the facial nerve was also necessarily sacrificed. The upper part of the sterno-mastoid was infiltrated. This was removed by an incision through the healthy muscle. The patient made an uninterrupted convalescence, and has remained well for eight months.

LIPOMATA.

Eleven lipomata were excised. They were generally single, encapsulated, of moderate size, and presented the pathognomonic symptom, *i. e.*, dimpling on pinching up the overlying skin. In one case the growths were multiple; in one the tumor was not encapsulated; in one it exhibited a migratory tendency, travelling from the superior carotid

triangle to the sternal notch. All these cases healed promptly, generally under one dressing.

In the following instance the diagnosis was exceedingly obscure, and was only made after incision :

Lipoma of leg.—E. M., male, aged sixty-two years, came for advice on account of a swelling involving the antero-external aspect of the right leg. He stated that in 1887 he had an acute painful swelling under the right patella. This disappeared under treatment. In 1880 the present growth made its appearance as a uniform swelling over the antero-external border of the tibia. It was soft at first, but gradually became hard. The tumor extended downward until it reached the front of the ankle, and it took on a nodular character (Fig. 15). The patient did not complain of pain. The

FIG. 15.



Fibro-lipoma of leg situated beneath the deep fascia.

skin was not involved. The chief interest of this case is in regard to the diagnosis. The peculiar appearance of the tumor, considered in conjunction with the age of the patient and the seat and history of the growth, seemed to make impossible a positive diagnosis between malignant neoplasm, tenosynovitis of unusual proportions, and lipoma. The growth was found to be a fibro-lipoma lying beneath the deep fascia, sending prolongations along the inter-muscular spaces and adherent at points to the inter-osseous membrane. An extensive dissection was required for its removal. The patient made a perfect recovery. The tumor weighed over two pounds.

SARCOMA AT BASE OF NECK.

J. B., male, aged nineteen years, came to the hospital on account of a large tumor at the base of the neck on the left side. Over a year before presenting himself here he noticed a small lump in the supra-clavicular fossa, at that time movable. It did not seem to grow much for a time, but became irritated by the pressure of the baskets which the patient's occupation obliged him to carry on his shoulder. In two months' time the growth had increased from the size of a pigeon's egg to that of a goose-egg, and from this time growth was very rapid. The measurements of the tumor were

FIG. 16.



Sarcoma of the base of the neck.

as follows: The smallest circumference of its base, nineteen inches; greatest longitudinal measurements from base to base, fourteen inches; greatest diameter, six and one-half inches. There was marked discoloration of the skin, through which greatly distended veins were seen ramifying; the skin was ulcerated on account of the irritating applications made by a "cancer doctor," and there was marked local increase of temperature (Fig. 16). The tumor was excised, and, on microscopic examination, proved to be a spindle-celled sarcoma. It weighed more than four pounds. The patient made a rapid recovery.

SARCOMA OF THE FOOT.

A. S., male, aged forty-five years, first noticed a small, dense lump on the sole of the right foot, between the first and second metatarsal bones, five years ago. But little inconvenience was caused by the growth, which did not appreciably increase in size for about three years. At the end of this time a swelling was noticed on the top of the foot, corresponding with the seat of tumor on the plantar surface. From this time growth was rapid and continuous, reaching the size shown in the cut (see Fig. 17) in less than two years. There was no severe pain at any time—only a sense of discomfort from pressure. On presenting himself for examination, the skin covering the tumor was found not involved; there was no redness or other sign of inflammation; the superficial veins were unduly prominent.

The growth was believed to be either a sarcoma or an enchondroma, with the probabilities in favor of the former. The patient was advised to submit to exploration of the tumor, and if it was found malignant to have the foot amputated. This was accepted, and, after anæsthesia, a free incision through the enlargement revealed an unmistakable sarcoma, which it was impossible

FIG. 17.



Sarcoma of the foot.

FIG. 18.



Sarcoma of the foot laid open, showing the central original portion which remained encapsulated for years.

to enucleate, and amputation was accordingly performed through the lower third of the leg. The patient made a rapid recovery without complication.

Examination of the growth revealed a small, firm, encapsulated tumor, about the size of a shellbark, between the first and second metatarsal bones, which had been the growth first noticed by the patient. The large mass had apparently sprung from a rupture of the capsule of this, so that before the capsule broke the disease remained localized (Fig. 18). The beginning of the rapid growth marked the time of this rupture.

Examination of microscopic sections confirmed the clinical diagnosis.

The case is one of many that emphasize the importance of early operation in new-growths. For years this growth was probably removable without sacrifice of the foot, and certainly with much less risk of generalization than at the time when he finally submitted to operation.

VESICAL CALCULUS.

Twenty operations have recently been performed for vesical calculus. Litholapaxy offers so many advantages over other methods that in all suitable cases this procedure has been adopted. A very marked advantage is the rapid convalescence after litholapaxy. The patient is able to leave the bed on the fourth or fifth day, and to leave his room at the end of a week. The operation itself, if properly performed, is almost free from danger, and the mortality in healthy subjects very low. The operation is applicable to a wider range of cases than was formerly supposed. It has been found, for example, that litholapaxy has the same arguments in its favor in children that it has in adults, and that with instruments of the proper size no more difficulty is experienced. One patient, a boy of seven years, presented the usual symptoms of vesical calculus. A stone, about a quarter of an inch in diameter, was found, and was crushed and washed out. The patient was dismissed on the fourth day entirely well. The other cases of this operation were in adults whose ages ranged between twenty-three and sixty-two years. They all made a satisfactory convalescence. In three cases, on account of either a very high degree of cystitis, or the presence of strictures, or both, supra-pubic lithotomy was performed.

In another case, previously reported,¹ but mentioned now for the sake of its unusual clinical interest, the lithotrite failed to grasp the stone. The high operation was resorted to. The stone was so large that the lithotrite blades could not be separated sufficiently to seize it, though the instrument had a range of more than two inches. It was nearly encapsulated, and was tightly adherent to the surrounding mucous membrane. The calculus weighed about nine and a half ounces. The patient made a complete convalescence with entire relief of his symptoms, which were of more than twenty-five years' duration. The exact size and shape of this stone are shown in Fig. 19, and are contrasted with those of the foreign body shown in Fig. 20, which Dr. White recently removed from

¹ *Annals of Surgery*, January, 1890.

the bladder, for the sake of emphasizing the importance of infection, or of its absence, in the production of vesical symptoms. In the former case the symptoms of stone dated back twenty-six years, but in all

FIG. 19.



Uric acid calculus, successfully removed after symptoms of stone had persisted for twenty-six years. Exact size and shape.

that time there had been little or no serious disturbance; the patient worked at his trade of shoemaker; his urine, while it contained a few pus cells, was otherwise sterile, and his kidneys remained sound. In

FIG. 20.



Wax taper removed from bladder.

the second case a high grade of cystitis was set up by the presence of a soft waxy taper introduced by the patient himself but a few days before; the urine was loaded with pus, fetid and poisonous, and a septic fever was present from the beginning. The size and even the shape of a foreign body in the bladder are altogether secondary, as regards the production of subjective symptoms, to the presence or absence of the pyogenic, and especially the saprophytic microbes.

The fatal results were all due to extensive renal disease, and were as follows:

J. R., aged seventy years, had suffered for many years from vesical irritability. He was extremely wasted and anæmic, and was so harassed night and day by bladder tenesmus that immediate relief was imperatively demanded. His constant suffering rendering futile all efforts directed toward

improving his general condition, supra-pubic lithotomy was performed, and the stone rapidly extracted. Although but an unusually small amount of ether was given, the secretion of urine was arrested, and the patient died in three days from uræmia. The kidneys were the subjects of advanced pyonephrosis.

E. G., aged sixty-five years, was found to have a stone in the bladder, a considerable degree of cystitis, and a number of strictures. On account of the latter litholapaxy was impossible for the relief of the stone, and it was decided to perform supra-pubic lithotomy. The patient presented all the evidences of advanced senile degeneration, arcus senilis was marked, the arteries extremely atheromatous, and the patient well-nigh exhausted by the pain and frequent micturition from which he had suffered. Chloroform was administered on account of suspected kidney degeneration, and the stone removed by the high operation. The patient did well for two days, when he became delirious, and died from uræmia. At the autopsy atheroma of the vessels was very noticeable. Seven hemorrhagic infarcts of the lower lobe of the left lung were seen; the spleen was enlarged and indurated. The right ureter presented an impermeable stricture about four inches from the bladder, and the corresponding kidney was hydronephrotic. The left kidney was enlarged, the seat of calcareous deposit, with numerous cysts, and was in a condition of beginning hydronephrosis.

Supra-pubic lithotomy and prostatectomy.—J. S., aged sixty-six years. Urinary symptoms began sixteen years previously; the catheter had been required at intervals for eight years, and constantly for four years. He had lost flesh rapidly, was sallow, had chronic bronchial cough; in twenty-four hours twenty ounces of urine were passed, containing large quantities of pus, hyaline and granular casts, and vesical debris; a medium-sized stone was detected in the bladder, and an enormously large prostate was discovered. There was a mitral murmur with evidence of beginning consolidation of the right apex. The patient's sufferings were so great that operation was decided upon in spite of the unfavorable outlook. A supra-pubic operation seemed indicated in this case. The calculus crumbled under the forceps and was removed with the finger and scoop; the mucous membrane covering the prostate was snipped at different points and projecting portions of the prostate were enucleated with the finger. The amount removed weighed three ounces. The patient did well until the middle of the fourth day, when he developed maniacal delirium, refused food, and had to be kept in bed by force. He gradually passed into a condition of coma and died seven and a half days after operation. At the autopsy the wound seemed to be doing well. The ureters were distended to nearly the size of the wrist, and the kidneys were almost completely disorganized and contained multiple purulent foci.

Cystitis.—Many patients were treated for chronic cystitis. The first point observed in this service in the treatment of such cases is the overcoming of mechanical interference with complete evacuation of the bladder, by mechanical treatment, operation, or the use of the catheter, in accordance with the nature of the case.

Tenesmus is treated by local applications to the prostatovesical region and in some cases by overstretchings of the deep urethra and vesical neck. Of the local applications, instillations of silver nitrate, ten drops at a time repeated every second day, are found most serviceable. One per cent. solution is first used, the strength being gradually increased up to 10 per cent. Guyon's instillations of bichloride of mercury 1:10,000, ten to twenty drops at a time, are successful in many instances.

The urine is rendered sterile, or at least this is attempted, by giving salol and boric acid by the mouth, putting the patient on milk diet, and

irrigating the bladder with warm antiseptic lotions. Of these, the most valuable are nitrate of silver, 1:1000, boric acid saturated solution, peroxide of hydrogen 1:6 to full strength.

Prolonged hot baths, counter-irritation, and the judicious use of salines are all useful adjuncts. Marked improvement invariably took place, and the recent cases were almost always cured.

OPERATIONS ON BONES.

For Necrosis.—The rule in this operation has been to make an incision so free that the diseased bone can be both seen and felt; chisels, gouges, curettes, and trephines are employed to attain the end of thorough removal of all diseased bone. In any extensive operation the Esmarch tube is employed, but the limb is rendered bloodless by elevation for five minutes rather than by the use of the elastic bandage. This is thought to diminish or do away with the vasomotor paralysis which sometimes follows the use of the tube, and favors consecutive oozing. The after-treatment consists in filling the cavity with sterile iodoform gauze and covering the wound with a firm antiseptic dressing. Ninety per cent. of these cases were of tubercular origin, and in these general measures were adopted in addition to operative interference.

Foot and ankle. Three cases in which the disease affected the astragalus and lower extremity of the tibia were operated upon. These all recovered, and, although the range of motion in the ankle was impaired, the joint was a useful one.

Femur. Eleven cases in which the disease affected the femur have been operated upon. Among the exciting causes were gunshot wounds, blows, and falls upon the part, unusual muscular exertion, etc.; four of the cases were post-typhoidal. All were subjected to the usual operation and all recovered with perfect use of the limb. In one case, giving a tubercular family history, there was central necrosis of the entire shaft of the femur. The operation was prolonged, difficult, and attended with much bleeding. The patient was profoundly shocked, and did not react thoroughly until the third day. From that time his convalescence was slow but uninterrupted. He recovered entirely with a functionally perfect limb.

Tibia. Seven cases of necrosis of the tibia have been treated. In two of these there was almost total central necrosis of the shaft. In operating, the periosteum was spared, the entire canal of the bone opened, and a sequestrum representing a cast of the interior of the bone was removed, together with a large portion of the irregular involucrum. Healing was slow, a few sinuses persisting for many weeks. The patients were, however, able to walk on the limb. One case, seen early, presented a small node on the anterior face of the tibia, which had been the seat of severe pain for four weeks. The bone was trephined at this point and a focus of softening (tubercular) not larger than a pea was discovered. This was well curetted, and treated as the other cases, with perfect relief of symptoms. In another case, a lad aged fifteen years, a blow received just above the tubercle of the tibia, five years previously, had been followed by osteo-periostitis and some superficial caries. The wound had healed solidly soon after, and the cicatrix remained firm. There was some thickening and hardening of the upper end of tibia. The boy had persistent gnawing, boring pain, worse at night, and rendering his life miserable. This led to the diagnosis of pyogenic osteitis, as the head of

the tibia is one of its favorite seats, and it occurs by preference in adolescents and not infrequently years after an injury. An opening was made with gouge and chisel, but no pus was found until it had been carried through the thickened bone to a depth of two and a half inches, where a collection of not more than half a drachm of pus was evacuated. The operation was followed by instant relief.

All of the patients recovered with useful limbs.

Humerus. Three cases have been operated upon for necrosis affecting the humerus; one was a case of central necrosis involving the upper half of the shaft of the bone. A sequestrum five inches long was removed, leaving a shell of involucrum so thin that splints were applied to prevent spontaneous fracture. This patient recovered with a strong arm.

Maxillæ. Five cases of necrosis of the lower jaw, and two of the upper jaw, were all due to infection with the organisms of suppuration through the cavities of carious teeth. All made a satisfactory recovery.

Patella. One case of necrosis of the patella presented himself for treatment. He suffered from suppurating sinuses of long standing, affecting the front of the knee, and following a slugshot wound. The patella was found to be necrosed, and a number of loose fragments were removed. Healing followed, with no diminution of function or usefulness.

Skull. One case of extensive syphilitic necrosis of the skull was operated upon. Several sinuses led to a number of large fragments of loose bone, constituting perhaps one-third of the frontal and parietal bones. These were removed, and mixed treatment administered. Complete healing followed. The initial lesion was contracted fifteen years before.

FRACTURES.

In the following series of fractures no case of non-union has occurred, and in every instance the patient has recovered without appreciable deformity and with perfect restoration of function, with the exception of the intra-capsular fractures of the femur and a vertebral fracture. The seat of fracture and the dressings were as follows:

Acromion process. Two cases. Velpeau bandage.

Carpus (scaphoid). Anterior and posterior splints.

Clavicle. Four cases. One of these was bilateral. A Velpeau bandage was applied to the three cases of single fracture. In the bilateral fracture no dressing was applied; the patient was kept in the recumbent position, on a hard mattress with a flat pillow, and with sandbags on either side of the head. At the end of two weeks and five days the bones were firmly united and in good position.

Femur. Eleven cases. Three of these were intra-capsular.

Extension was made by means of a stirrup, to which was attached a cord passing through a pulley placed at the foot of the bed, and bearing a weight at the other extremity. The adhesive straps forming the stirrup were carried up as far as the upper end of the lower fragment; a roller bandage was then applied to the limb. Lateral support was obtained by means of sandbags. The amount of weight employed depends upon the degree of shortening. It is thought best to begin with moderate weight, and to measure the limb from day to day, adding gradually to the extension until the shortening is overcome. In no case was the shortening after cure greater than an inch and a half.

Fibula. Four cases. The limb was fixed in a fracture-box.

Humerus. Seven cases. One of these was a compound fracture, involving the elbow joint and requiring excision.

A drainage-tube was introduced, the wound stitched with silkworm-gut, dressed antiseptically, and placed on an anterior right-angled splint. The patient recovered with a useful limb. In two cases the internal condyle was

involved. In these instances anterior obtuse-angled splints were applied. Another case presented a fracture of the internal condyle and dislocation of the elbow. The limb was dressed on an anterior obtuse-angled splint; recovery followed without loss of motion. The other cases were dressed on internal right-angled splints.

Maxilla (inferior). Two cases. Pasteboard trough, held in place by a Barton bandage.

Maxilla (superior). Two cases. In one of these the squamous portion of the temporal bone was also fractured. There was no displacement, consequently no dressing was required.

Patella. Five cases. In three of these Agnew's splint was applied. In one, both bones of the leg and the sacrum were also fractured. The leg was placed in a fracture-box. The sacrum did not need any appliance to maintain the proper positions of the fragments. All made a satisfactory recovery without any impairment of function. The two other cases were subjected to operation, one after Barker's method, and the other after Stimson's. (See January No. of THE JOURNAL.)

Radius (Colles'). Six cases. In two instances anterior and posterior straight splints were applied, in addition to pads, over the projecting fragments; in the remaining four cases Bond's splint was applied. Equally satisfactory results were obtained by both dressings.

Radius and ulna. Four cases. Anterior and posterior straight splints, the hand being in the semi-prone position.

Ribs. Seven cases. The affected half of the chest was immobilized by strips of adhesive plaster.

Skull. Nine cases. Two were simple, six were compound, and in one the fracture was at the base. All were trephined except the latter case. Two died; one of these was the fracture at the base, the other was a compound fracture, with extensive laceration of the brain substance. The other seven cases made a satisfactory recovery.

Tibia. Three cases. The limb was fixed in a fracture-box.

Tibia and fibula. Twelve cases. Four were simple, five were compound, and three were compound and comminuted.

The method used in compound fractures of the leg is that employed by Mr. Frederick Treves at the London Hospital. The limb and wound are washed and irrigated on admission; the fracture is set and the limb immobilized. If oozing continues, as it generally does in these cases, the nurse is instructed to dust iodoform over the wound at short intervals, until finally a clot of blood, impregnated with the iodoform powder, forms an aseptic scab, under which, as a rule, healing takes place as in simple fractures. The fracture-box and bichloride towels which envelop the limb are so arranged that the wound can be exposed with no disturbance to the fracture. A long series of cases under Mr. Treves' care at the London Hospital, and under Dr. White's, at the University and German Hospitals, justify confidence in this method.

Vertebra (dorsal). One case. The patient is paraplegic.

LUXATIONS.

Six luxations of the shoulder and one of the elbow were reduced under ether. With two exceptions these were recent cases, and reduction was accomplished without difficulty. One old case was of nine weeks' standing. The patient, a large, powerful man, aged thirty-six, presented the typical deformity and disability of a subcoracoid luxation. He was etherized, and Kocher's method was given a thorough trial, but without satisfactory results. Manipulation and traction in all its forms, both with and without leverage, failed to effect reduction; finally, after over two and a half hours' effort, the bone slipped into place during forcible outward traction, aided by direct pressure on the head of the bone. The patient recovered with a functionally perfect arm.

The second case was very similar in the situation of the bone, etc., but was even more unpromising, as the luxation had remained unreduced for thirteen weeks, and the adhesions were exceedingly dense. They were, however, broken up one after another by the methods described above, and the head of the humerus was finally placed in what was left of the glenoid cavity, and with an excellent range of motion.

EPITHELIOMATA.

Forty-five patients have presented themselves on account of epitheliomata about the face. The majority of these involved the lips. In such cases, if the disease had not advanced too far, a V-shaped incision was made around the lesion and the wound brought together with hare-lip pins. In other instances, where the lesions were of large dimensions, plastic operations were performed to fill in the gap left after removal of the neoplasm.

The invariable rule is to remove every portion of infected tissue, and from one-quarter to one-half inch of sound tissue beyond it. In one case, a man aged fifty-five years, the disease had existed for more than five years, during which time numerous "plasters" had been employed. The lower lip, the soft parts of the chin, and of the cheek back to the masseter muscle, had been destroyed. The alveolar border of the lower jaw was gone. For the relief of this condition the middle portion of the inferior maxilla was removed, and the lip and chin formed from skin taken from the neck and cheek. The wound healed satisfactorily and the patient left the hospital temporarily free from disease.

In another case, a man aged fifty-two years, whose upper lip had been entirely destroyed, the lip was restored by flaps taken from the cheeks. The immediate result of this operation was very gratifying, but the trouble returned some months afterward.

OPERATIONS ON NERVES.

Nerve-suture.—S. M., male, aged twenty-four years, six months before entering the hospital fell upon broken glass and sustained a wound of the left wrist. It was shortly observed that the thumb and first three fingers were paralyzed and anæsthetic. There was gradual return of motion and sensation in the ring finger, and to a much less extent in the middle finger. The index finger remained absolutely paralyzed and analgesic, although there was slight sensation on deep pressure; its skin presented atrophic changes. The thumb could not be flexed, but the power of adduction remained. The inside of the thumb over the distal phalanx was analgesic; sensation had returned in the other portions. The ball of the thumb was much wasted. Just above the scar in the wrist was to be felt a small, hard nodule, slight pressure on which caused a tingling sensation.

An incision was made along the course of the median nerve, including the scar of the wound. The bulbous proximal end of the nerve was readily found, although displaced somewhat toward the ulna. The distal end was only found after the dissection had been carried some distance under the anterior angular ligament. It was somewhat enlarged and was adherent to one of the superficial flexor tendons. It was dissected loose, and both ends were retrenched until the sections presented a healthy appearance. The nerve was then united by four fine catgut sutures threaded on ordinary sewing needles. These sutures were passed not only through the sheath, but through the substance of the nerve. The wound was dressed antiseptically and placed in a posterior splint that strongly flexed the hand, thus relieving the nerve of tension. The following day there was slight motion in the index

finger and marked increase in sensation. Healing took place uninterruptedly, and there now seems (six weeks after operation) every prospect of entire recovery of function.

The propriety of uniting divided nerves is universally conceded. Even when from original neglect of this procedure secondary changes, such as atrophy of muscles, degeneration of nerve fibres, and ascending neuritis have taken place, operation holds out a fair prospect of ultimate success. Statistics (Bowlby) show that in over 43 per cent. the results have been entirely satisfactory, while there has been marked improvement in the great majority of cases. The case reported above shows what is constantly noted, *i. e.*, return of sensation before motion; but the very rapid return of sensation, as in this instance, is, for cases of secondary nature, comparatively rare.

Nerve-stretching.—Three cases of sciatica were treated by nerve-stretching. All were inveterate cases, which resisted every form of conservative treatment. Two were entirely cured by operation, one experienced marked relief. This operation is so quickly performed, is usually so devoid of risk, and is in suitable cases attended with such good results, that it should be more frequently recommended. The nerve is exposed and hooked out of the wound in a few seconds; the wounds unite promptly, requiring no drainage. These patients were kept a week in bed, a week on chairs, and were then allowed to go about as they wished.

In one case the musculo-spiral was stretched for the relief of paralysis, apparently occasioned by a neuritis of long standing, which in turn was due to an imperfectly reduced fracture. Some improvement followed the operation, and the case is steadily improving under electricity and massage.

In three cases of obstinate neuralgia an inch of the inferior dental nerve was excised, this operation being performed through a trephine opening made in the inferior maxilla. All these patients experienced relief, lasting in one case upward of a year. In all it was probable that the pain was due to a peripheral neuritis starting in the branches distributed to a carious tooth, and continuing in the main trunk after the teeth had received proper attention. If this theory is correct, and the nerve changes have not extended beyond the seat of excision, the operation may be expected to give permanent relief.

Nerve-grafting for musculo-spiral paralysis.—Mrs. W., aged thirty-four years, some months before coming under observation had had a neuroma removed from the musculo-spiral nerve by a surgeon in a neighboring city. Following the operation there was complete paralysis of the muscles supplied by this large trunk. The extensor muscles of the forearm were atrophied when she applied for advice, and there was absolute loss of power to extend the hand.

It was decided to make an effort to suture the ends of the nerve. Accordingly an incision was made along the cicatrix of the former operation. The

two ends of the divided nerve were found, but were so separated that direct suture was impossible. To fill up the existing deficiency, a portion of the sciatic nerve of a dog was employed. After the ends of the musculo-spiral had been freshened the transplanted nerve was sutured, end to end, to the former, the whole being encased in a tube of decalcified chicken-bone three inches in length. The wound healed by primary union. The patient remained under observation six weeks. During this time, however, no improvement in the patient's condition was noted.

Hare-lip.—Ten hare-lip operations were performed, the flaps being so cut that the disfiguring notch often left after these operations was avoided. There were no complications; the pins were removed in seventy-two hours, tension on the wound being prevented by rubber adhesive strips, drawing the cheeks forward. In some of the cases iodoform collodion was applied as a dressing; this, however, is stiff, difficult to remove, and favors retention of discharge along the pin tracts. Iodoform gauze, held in place by rubber adhesive plaster, cut in the form of a double paddle, each blade of which was applied to one cheek, drawing it forward, was found to be the most satisfactory dressing.

Perforating appendicitis.—C. D., male, aged twenty-five years, was seized with sudden severe pain in the right iliac fossa, accompanied with vomiting, four days before admission to the hospital.

On admission the abdomen was so tympanitic that palpation failed to convey any positive idea of the nature of the trouble, but there seemed to be some increased resistance in the right iliac region. The respirations were shallow, hurried, and entirely thoracic; the pulse was thready and above 140 to the minute; the temperature 100°. Ether was administered, an incision was made in the right iliac region, and an abscess containing three ounces of pus mixed with feces was evacuated. The appendix was greatly thickened, and was perforated. It was removed and the stump was closed with a running catgut suture. As the general peritoneal cavity was infected, a median incision was made, and the cavity was flushed with warm sterilized boric acid solution. Both wounds were drained and closed antiseptically. The abscess cavity was irrigated every three hours with boric acid solution. The fecal odor disappeared and the patient apparently improved, but the following day symptoms of sepsis reappeared, the patient became dull, and later comatose, sinking rapidly, and died thirty-six hours after operation. An autopsy was not obtained, but it is probable that the septic condition was due to collection of pus shut off by adhesions.

Inguinal Hernia.—Five operations were performed for the radical cure of hernia. In all these cases the hernia could not be comfortably retained by a truss. It is the rule in this service to attempt a radical cure only in those hernias which give some special indication for the operation. So many cases can be made comfortable by the application of a proper truss, and, on the other hand, there are so many relapses after the so-called "radical cure," even in good hands, that it is thought best to select for operation only those cases that are unable by reason of their occupation, or owing to some peculiarity of temperament, or to some exceptional condition of the hernia itself, to wear a rubber truss.

Macewen's operation was performed in the above cases with rigid attention to all the details. The results from this operation when it is

properly performed, and particularly the results in the hands of its author, are more satisfactory than those claimed for any other operation except, perhaps, that of Bassini, which has as yet been performed by so few surgeons that its true value is still to be determined. All these patients made a prompt operative recovery, and with one exception passed from observation. They were kept in bed for from four to six weeks, and were then allowed to get up, wearing a properly fitted truss. During the two months they were in the hospital there was no relapse. In the following case there was relapse due to pronounced ascites:

F. G., aged fifty-four years, suffered for some years with ascites and a large scrotal tumor on the right side. The hernia could not be retained by a truss, and was rapidly increasing in size. Incision was made over the hernial sac, and when the latter was opened the hernia was found to be of the congenital variety, the ascitic fluid draining out freely. A case of omentum the size of a fist was tied off and the stump returned to the abdomen. Macewen's operation was performed. The patient made a rapid recovery, and remained well several months; but finally the hernia recurred, apparently on account of an enormous collection of fluid in the abdomen.

COCYGOODYNIA.

CASE I.—A. D., aged ten years, three years ago in climbing upon a chair slipped and fell astride of the back. After this accident he complained of persistent pain and tenderness over the coccyx, aggravated by sitting down. There were no local signs of inflammation, nor evidence of dislocation. The coccyx was removed, and entire relief of the pain followed.

CASE II.—D. L., male, suffered extreme pain in the region of the coccyx for a long time. The coccyx was excised. Wound healed rapidly. Patient discharged on the twelfth day free from pain.

CASE III.—L. M., aged thirty-five years, a typical neurasthenic, had been subjected to a large number of gynecological operations, but had escaped oöphorectomy. She complained of a constant pain in the coccyx, aggravated by sitting down. The pain was so severe as to interfere with her work. The coccyx was removed, the wound closed without drainage, and the patient discharged on the seventh day free from pain.

NEPHRORRHAPHY.

Mrs. D., white, aged thirty-two years, complained of constant dragging pain in the right lumbar region, which was made worse by jarring. Upon palpating the abdomen a tumor was found in the right lumbar region. It was rounded, smooth, and so movable that it could be made to occupy the umbilical, and even the left lumbar regions. Her urine was normal.

The kidney was reached through a lumbar incision, and stitched to the abdominal parietes by four silk sutures passed through the capsule and the cortical substance. The wound was packed with gauze and allowed to heal by granulation, in order more firmly to fix the organ by means of the cicatricial tissue resulting. After operation the urine was high-colored and contained a large amount of albumin, but no blood corpuscles were seen. The albumin gradually disappeared and the patient made a good recovery, gaining forty pounds in weight in three months, and was discharged free from her former symptoms.

DISEASES OF THE RECTUM.

Cancer. Dilatation.—P. C., aged fifty years, came to the hospital on account of pain in the rectum, associated with difficulty in the act of defecation. His passages were unformed, and pus was discharged from the bowel. On

digital exploration, a cancer was detected extending far beyond the reach of the finger and densely infiltrating the surrounding structures in every direction. As it was evident that complete extirpation was impossible the stricture was dilated with bougies, and the patient was directed to return to the hospital for the operation of lumbar colotomy when obstruction became harassing.

Cancer. Colotomy.—L. B., aged fifty-two years, sought advice on account of obstruction of the bowel, dating from a violent strain eight months before. Defecation was painful, and there was an increasing discharge of blood and pus with the stools. One month before admission the patient suffered from a violent cystitis, and noticed at that time that gas and fecal matter passed *per urethrum*. He was greatly wasted on account of the disease, and the accompanying pain was very severe. On examination, the rectum was found filled with a carcinomatous mass extending beyond the reach of the examining finger, and involving the bladder and peri-rectal tissues. For the relief of the obstruction left lumbar colotomy was performed. The colon was provided with a complete mesentery, which necessitated the opening of the peritoneal cavity. The parietal peritoneum and skin were first stitched together. The gut was then fixed to this opening by a continuous suture. Great relief was afforded, and the patient returned to his home. He died three months later from extension of the disease.

Stricture. Dilatation.—Mrs. M., contracted syphilis eight years ago. There was probably a rectal chancre. Three years afterward she was operated on for fissure. Later she suffered from pain in defecation and a purulent blood-stained discharge from the bowel. Examination disclosed a dense stricture two inches within the anus that would just admit the tip of the little finger. Gradual dilatation was practised until the bowel had regained its normal calibre.

Two other cases of simple stricture were subjected to the same treatment. Both were discharged well.

Stricture. Proctotomy.—Mr. M., brought by Dr. Ayars, had suffered for some years from a gradually increasing stricture of the rectum, which had become too slight to admit the tip of the finger, and had resulted in a fistulous communication with the urethra, through which gas and fecal matter were constantly discharged. No satisfactory history as to etiology was obtainable. Syphilis seemed to be excluded; there had been no dysenteric symptoms; nor was there any history of simple ulcer. The stricture lacked the characteristics of malignancy.

It was divided, together with the sphincter and all the soft tissue, back to the coccyx. The wound was first packed around a large catheter with iodoform gauze, and was subsequently kept open by the frequent introduction of rectal bougies. Great relief was at once afforded, and there seems a fair prospect of permanent cure.

Prolapse, with hemorrhoids. Ligation and cauterization.—J. H., aged forty-six years, had suffered from protrusion of the bowel for several months. On examining the patient, he was found to have hemorrhoids in addition to the prolapse. The hemorrhoidal masses were ligated in the usual manner. The protruded mucous membrane was burned in the direction of the long axis of the bowel with strong nitric acid, leaving strips of healthy mucous membrane between. A piece of lint saturated with oil was then placed over the prolapse and the bowel was reduced. The nitric acid caused a superficial slough, followed by sufficient cicatricial contraction to prevent a recurrence of the trouble. The patient was dismissed cured.

Hemorrhoids.—Twenty cases of hemorrhoids presented themselves. The piles were usually of the columnar variety, being both internal and external. Ligation, the clamp and cautery, and excision, are the three operations now in favor for the cure of this condition. Eighteen of the cases in this service were treated by ligation, two were excised.

The objection to the clamp and cautery is that this method affords less security against hemorrhage. Excision sometimes implies the loss of much blood. It is a comparatively slow operation, and in many cases is needlessly severe. Ligation is bloodless, rapid, and efficient. The theoretical objections urged against it have been controverted by a very large clinical experience. Every case healed promptly and uneventfully. Complications, such as tetanus, pyæmia, peri-rectal suppuration, and hemorrhage were never observed.

Before operation the bowels are thoroughly opened by a laxative followed by an enema. Previous to the administration of ether the external hemorrhoids are encouraged to prolapse by seating the patient over a pail of hot water and directing him to strain. After anæsthetization the sphincters are overstretched. The transfixion method is always employed as giving additional security against slipping of the ligature. Before tightening the threads the muco-cutaneous border around the base of the pile is incised, the ligature being made to lie in the line of this incision. After ligation the piles are cut off, usually only enough tissue being left to prevent the knots from slipping. The raw surfaces are then touched with pure carbolic acid, dusted with iodoform, and, when possible, reduced within the sphincter. An opium suppository and an iodoform suppository are then introduced into the bowel, some strips of iodoform-gauze are loosely packed just within the anus, and absorbent cotton and a T-bandage complete the dressing.

Anal Fissure.—Nine cases of this affection, all presenting the characteristic symptom of severe pain *after* defecation, have recently been operated on as follows: The ulcer was first scarified; the sphincters were next overstretched by introducing the thumbs into the anus and slowly separating them until they were in contact with the tubera ischii, and, finally, the external sphincter was divided. One patient had suffered from the affection for five years, during this time subjecting himself to different methods of treatment without relief. All of the cases of this series were rapidly and completely cured. The average time in bed was three days; confinement to room or house, six and a half days. Inveterate pruritus ani has been cured in three extremely troublesome cases by the same method, omitting the division of the sphincter.

Anal Fistula.—Twenty-four patients presented themselves for relief from this condition. All gave practically the history of a precedent abscess in the ischio-rectal region, which either opened spontaneously or was opened by the surgeon, leaving a fistula which continued to discharge. A tubercular family history was elicited in a far larger proportion—more than two-thirds of the cases—than could be accounted for by mere coincidence.

In all of the cases a purgative is given the night before operation, and an enema the following morning. The patient is *fully* anæsthetized, many of

the reported ether deaths having occurred at the beginning of operations about the anus, complete insensibility not having been produced. The anus is stretched as in fissure, the internal opening when this is present is found, and the tract leading to it is laid freely open. Every part of the wound is searched for other sinuses, which, if found, are also laid open. The wound is then touched with caustic potash, or with a 60-grain solution of zinc chloride. A suppository of 5 grains of iodoform and 1 grain of opium is inserted. The wound is thoroughly packed with gauze (preferably iodoform gauze), a T-bandage applied, and the patient put to bed.

Upon the subsequent dressing of these patients depends the final result. The essential point in the packing is to carry the initial extremity of the strip gauze packing *into the rectum*, after which the wound cavity should be gently filled with the body of the strip, care being taken to keep the edges of all the sinuses apart, so that healing must take place from the bottom of the wound only. The patients all made complete recoveries.

The average time in the hospital was about two and a half weeks, but this average is lengthened by the presence in the series of some very bad and long neglected cases. In two cases operated on by Dr. White for the late Dr. Agnew, who was present at the operations, fistulæ were dissected out completely and the wound brought together by deep and superficial interrupted sutures. Both attempts were failures, from infection of the wounds, which were reopened and packed in the usual way. The operation is the ideal one for fistula and ought to be feasible, though the practical difficulties in the way of local antisepsis are very great.

STRICTURE OF THE URETHRA.

Eighty cases of urethral stricture were subjected to mechanical or operative treatment.

In all urethral and bladder cases the patients were prepared by the administration of salol, gr. v, and boric acid, gr. x, four times a day. When there was abundant discharge the urethra was flushed out with saturated boric acid solution. The same antiseptic precautions were observed as in an ordinary surgical operation.

In but two cases was instrumentation or operation followed by chills or rise of temperature; in both of them the symptoms subsided in a few hours. There was no case of instrumental epididymitis or cystitis. In examining for stricture the standard adopted is as follows: A penis three inches in circumference should take a 26 or 28 French sound; for each added quarter of an inch in calibre a sound two sizes larger should be taken. This represents the normal calibre and not the extent to which the urethra can be stretched. In detecting stricture the bulbous bougie was used.

A larger scale is given by some authorities, but the sizes mentioned have been found in this service to be more nearly correct. Having determined the normal calibre of the urethra, a bougie-à-boule five or

six sizes smaller is passed into the bladder and allowed to remain a moment or two until spasm subsides. The instrument is then carefully withdrawn. In every case the bulb will be momentarily arrested and then pass on with a jump immediately after leaving the bladder. The cause of this obstruction is the posterior layer of the triangular ligament. Should any subsequent arrest of the bougie occur, it is due to a pathological condition—a stricture. If the instrument passes the entire length of the canal anterior to the triangular ligament without arrest or evidence of a roughness of the mucous membrane (and without any point of especial sensitiveness having been noticed by the patient), a larger size is used until the full normal calibre is reached and the possibility of stricture is excluded. Of course, if the instrument first selected cannot be passed, smaller sizes are to be employed. In case the meatus will not admit the proper instrument, a meatotomy is done at once. If a stricture is detected, the shaft of the bougie-à-boule is grasped just at the meatus and the instrument withdrawn. By measuring the distance between the point at which the bougie is held, and the bulb, the exact location of the stricture may be determined.

Strictures within four and a half inches from the meatus that do not yield to dilatation, and this is frequently the case, are subjected to internal urethrotomy by means of one of the dilating urethrotomes. In case the instrument cannot be passed on account of the small size of the stricture, a filiform bougie is introduced and a Maisonneuve urethrotome passed over this as a guide. In this manner the calibre may be increased sufficiently to admit the dilating urethrotome. After the section has been made, a full-sized acorn bougie is passed in order to be sure that all contractions have been divided. Finally, a large soft catheter is passed into the bladder, and tied in place. About the fifth day, the use of steel sounds is begun and continued at increasing intervals until the patient is cured.

Strictures of the bulbo-membranous portion are in a great majority of cases amenable to gradual dilatation. Even in those cases in which the narrowing is very great, if a filiform can be passed, the outlook for cure by this method is favorable. Strictures that do not admit of the passage of even a filiform must be subjected to perineal section at once. In those cases in which a deep stricture does not yield to dilatation, external perineal urethrotomy is performed.

In cases where rupture of the urethra had occurred and extravasation followed, immediate perineal section was performed. An instrument was passed down to the seat of stricture, the point of this was cut down upon, and the dissection continued along in the fibrous tract representing the urethra, until a healthy portion of the canal was reached. A soft catheter was then passed into the bladder and retained. Any brawny or infiltrated tissue was incised. In two of these patients the

temperature at the time of operation was 96.8° F. Both recovered. Another case was brought to the hospital in a comatose condition, supposed to be suffering from typhoid fever. Examination revealed the fact that the scrotum and lower part of the abdomen were greatly swollen and discolored. Immediate perineal section was performed, and the infiltrated tissues were incised at several points. Gangrene was already well advanced. The patient died the same day from the profound toxæmia.

Seven patients suffering from urethro-perineal fistulæ were operated upon. The sinuses were followed up to the urethra, laid open, and the stricture divided. A catheter was kept in the bladder a few days, and the wounds packed with gauze. All of the cases were discharged cured. One case of traumatic deep urethral stricture, which would only admit a filiform, yielded to dilatation. Six other cases were subjected to external perineal urethrotomy. In all these operative cases the regular use of the steel sound was continued for some time afterward.

But two patients embraced in this list have died. One has already been referred to; the other was also profoundly septic when first seen; perineal section was performed, and an instrument passed into the bladder, but it was too late to be effectual. The autopsy showed a pouched and chronically inflamed bladder, advanced pyonephrosis, and a purulent infiltration of the cellular tissue lying between the posterior surface of the pubic bones and the bladder.

CASTRATION.

Castration was performed on four patients. Twice it was necessitated by carcinoma, once for ulcerating tubercular degeneration, once for sloughing gummatous degeneration.

One patient, a feeble old man of seventy-six years, died some days after operation. The wound was healing without suppuration, and though death was probably hastened by operation, it was in this case due to general debility.

The other patients recovered promptly. The shock which it is often stated is always attendant on such operations was not noted in these cases.

HYDROCELE.

Ether may be given for this operation, but this is not necessary, and few of the cases here reported were anæsthetized.

The radical cure of hydrocele has been performed in thirty cases. The procedure which is adopted is to withdraw the fluid by a moderate-sized trocar and canula, after which a quantity of pure tincture of iodine is injected. For each ounce of the fluid withdrawn a drachm of iodine is injected. In two cases there was reaccumulation of the fluid: one was

cured by a subsequent tapping and injection; the other, an old case, with a greatly thickened and indurated tunica vaginalis, was incised, the vaginal tunic was curetted and sutured to the skin, and the cavity was packed with iodoform gauze. The cure was rapid and complete in this case.

Three of these cases of hydrocele have been bilateral. Both sides were operated on at the same time. There were three cases of encysted hydrocele of the cord, two in children and one in an adult. In the former, the treatment consisted in passing a seton through the sac, tying the ends together, and applying an antiseptic dressing. A few patients refused the radical operation, and these were simply tapped. The results from the iodine injections were, with the exception of the two cases mentioned, entirely satisfactory. The pain excited was temporary; the fever and local inflammatory reaction subsided in two days; the patients were able to leave the hospital in a week, and there are no relapses to record.

Epiplotele with hydrocele.—J. F., aged twenty-seven years. The following case was diagnosticated as hydrocele complicated by hernia. He had worn a truss for inguinal hernia at irregular intervals. The day before admission to the hospital, while without the truss, he suddenly felt a pain in the lower part of the inguinal region, and found a considerable swelling in the scrotum. The tumor on examination was found to be non-resonant, gave no impulse on coughing, and was translucent at the lower portion, where palpation also detected fluid. The transparent portion of the tumor was tapped, but little fluid followed. An incision was made over the swelling, and a cyst was found adherent to the cord. There was considerable œdema of the surrounding cellular tissues. On further dissection an omental hernia was found. The omentum was ligated, the stump was stitched within the internal ring, and the wound was drained with a few strands of silk and closed. Healing was prompt and satisfactory.

HYPOSPADIAS.

Four cases of hypospadias were successfully treated by Duplay's method, modified in one instance by dissecting additional flaps from just behind the corona, by which added security against leakage was obtained at this point.

The first step in this operation consists in freeing the penis and dividing the band which curves the organ downward. After healing from this operation the glans is tunnelled and a new urethra is formed. To accomplish this a soft catheter is passed through the tunnelled glans and along the normal course for the urethra. An incision is then made upon each side of the catheter, and flaps are dissected up from each incision in both directions, *i. e.*, toward and away from the catheter. The two inner flaps are then turned in over the catheter, bringing skin surfaces in; finally the two outer flaps are sutured together over the inner flaps, bringing the raw surfaces of the two sets of flaps together, and closing-in the defect left in the median line between the edges of the

inner flaps, which are never broad enough completely to encircle the catheter. The final step of the operation consists in making the newly-formed urethra continuous with the opening through which the urine flows. This is accomplished by flaps cut in the same way.

In the cases treated several operations were required, but the ultimate result justified the time and patience these cases always require.

CIRCUMCISION.

This operation has been performed on twenty-seven patients, generally for the relief of phimosis; in some cases for the cure of inveterate herpes, of recurring warts, or for the removal of an indurated chancre. Union took place promptly, and there were no complications. The dressing consists of a strip of lint about a foot long and an inch and a half wide, wrung out of one part of phenol sodique to five of water, wrapped circularly around the line of incision. This dressing is kept wet with the same lotion. The stitches are removed on the fifth day.

VARICOCELE.

The radical operation for varicocele has been performed in seventeen cases. The histories of these cases are practically uniform. All suffered from pain in the testicle; in many the gland was markedly wasted; nearly all were sexual neurasthenics. The operative procedure uniformly adopted was as follows:

The pampiniform plexus of veins was carefully exposed by an inch and a half incision, after which two sterile silk ligatures were passed around the mass about one and a half inches apart, care being taken not to include the vas deferens, which may readily be recognized by the finger, and which is kept out of the operative field by an assistant. The ligatures were tied and the intervening portion of veins excised. One end of each ligature was cut off short and the remaining two ends were tied together, so that, in addition to occluding the veins, the cord was shortened and the testicle made less dependent, which materially aids in preventing a recurrence. Two or three silkworm-gut sutures sufficiently closed the wound, which was not drained. Healing by primary union has taken place with but one exception, in which instance a sinus formed, which finally discharged a ligature and then healed permanently. The result has been satisfactory in every instance. In some instances a complete transformation was wrought in the patient's character, every vestige of neurasthenia disappearing.

VARICOSE VEINS OF THE LEG.

Two cases exhibiting unusually well marked varices of the long saphenous vein were treated by excision of the dilated vessel. In

each case an incision, eighteen inches to two feet or more in length, was made; the veins were rapidly dissected out, were ligated above and below, and the portion between the ligatures removed. In one instance this was two and a half feet in length. Modern methods make this operation no more difficult than subcutaneous ligation. It is particularly indicated when the varicose condition extends above the knee, since here it is difficult to place an apparatus which will be comfortable and will make uniform support. Varicose veins of the leg more rarely require such a radical procedure, since here a rubber or elastic bandage will usually afford complete relief.

TENOTOMIES.

During the service a number of tenotomies for the relief of deformity incident to muscular contracture were performed. The contractures were treated in some cases by massage and Swedish movements, with the application of appropriate braces or splints. In a number of appropriate cases tenotomy was performed. In talipes equinus and equinovarus, comprising the greater number of operative cases, the tendons were divided, frequently the plantar fascia also. The foot was forcibly carried to a little beyond the correct position, and was maintained in place by the application of a plaster-of-Paris bandage. On the seventh or tenth day this bandage was removed and the patient was given a club-foot shoe and was instructed to walk.

After tenotomy of the hamstring tendons, a straight posterior splint was applied. In one case of tenotomy and extensive myotomy for the relief of contracture at the hip-joint there was considerable subcutaneous extravasation of blood. This was quickly absorbed, and the functional result was satisfactory. All of these cases ran the customary afebrile aseptic course.

WOUNDS.

A large number of wounds were successfully treated in accordance with modern methods. During the entire service there was not one case of erysipelas, tetanus, or other form of septic infection. One case was brought into the hospital suffering from a knife wound on the anterior aspect of the left shoulder. Gangrene was already well advanced, extending downward along the inner aspect of the arm halfway to the elbow-joint. The patient was suffering from diabetes. He perished from exhaustion in three days.

One case, a pistol-shot wound on the course of the femoral artery, three inches below Poupart's ligament, bled into the tissues of the leg on the third day after admission to the ward. A free incision was made, a large quantity of clotted blood was turned out, and the femoral vein and artery were exposed; both had been wounded. The artery was secured above and below, and the vein wound was closed by means of hæmostats, which clamped the

rent without occluding the lumen of the vessel. In forty-eight hours the clamps were removed; this was immediately followed by violent hemorrhage. The wound was opened and they were reapplied. Two days later there was another hemorrhage. The artery and vein were then tied above and below, and the wound was packed with iodoform gauze. Fourteen days later there was another hemorrhage, apparently arterial. The femoral artery was ligated above the profunda femoris, and the wound was packed. After this recovery was uneventful. Barring absence of pulsation in the tibials after the last ligation there was no sign of circulatory disturbance in the foot except during the first hemorrhage.

PLASTIC OPERATION FOR CICATRICIAL DEFORMITY OF HAND.

J. M., aged thirty-two years, presented himself at the hospital for the relief of a disabling deformity of the hand from a cicatricial contraction following a deep burn. The middle, ring, and little finger were flexed so strongly that they were in actual contact with the dense cicatrix, which occupied the whole of the inner two-thirds of the palm. The first phalanx of the index finger was also flexed to almost a right angle. The three fingers principally involved were entirely useless. The whole of the cicatrix was dissected out, exposing the sheaths of the flexor tendons. A large flap of skin and subcutaneous tissue was then raised from the left breast, turned directly back on its base, its freshened surface was applied to the area from which the cicatrix had been dissected, and its margins sutured to the healthy skin surrounding the operative field of the hand. The hand was secured in this position by a modified Velpeau bandage for eight days. The pedicle of the breast-flap was then cut across, and the hand dressed on a posterior straight splint with the fingers extended. The transplanted flap retained its vitality throughout. At the time the pedicle was divided it bled freely. In the months following this operation there was some contraction, so that the three inner fingers were again partially flexed. The patient has, however, a useful hand, and exhibits what to one unacquainted with his history would be a rare anomaly—namely, a marked hairy growth in the palm.

AMPUTATIONS.

In formal operations flaps have been made as follows: For the forearm, antero-posterior musculo-cutaneous flaps made from without inward; for the arm, modified circular flaps; for the shoulder-joint, Larrey's method; for the leg, Sédillot's method, or modified circular skin flaps; for the thigh, antero-posterior, modified circular, musculo-cutaneous flaps, the upper one being cut from without inward, and the lower one from within outward. In several cases in which amputation was performed for injury it was impossible to secure the usual flaps on account of destruction of the integument. In these cases it was necessary to modify the plan, using what tissue was available. In two cases of amputation through the thigh the wound was closed without drainage; the others were drained.

The stitches were removed, as a rule, from the fifth to seventh day after operation. Healing was usually complete at the end of two weeks, the patient being discharged in the third week.

Twenty-six major amputations were performed, distributed as follows: Forearm, 2—one for tubercular arthritis and one for gunshot wound; shoulder-joint, 2—one for sarcoma and one for railroad crush; arm, 3—

one for old ununited fracture and backward dislocation of elbow, and two on account of accidents; Chopart's, 1, Pirogoff's, 1—both for crush of the foot; leg, 5—one was a double amputation, four were performed for railroad crush, and one for sarcoma of the foot; thigh, 10—seven of the latter were for extensive tubercular disease of the knee-joint and contiguous structures; two of these were children two and three years old respectively. The other operations were performed for malignant tumor of the thigh (amputation just below the trochanter), for conical stump, and for epithelioma of the leg.

But one death occurred in this series. This was in the case of a man who received a crush of the leg. As the anterior and posterior tibial vessels were not injured, an attempt was made, after consultation with Dr. Agnew, to save the limb. Antiseptic irrigations were employed, in spite of which, however, the patient rapidly became septic, and amputation at this time failed to save him.

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